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THE MEASUREMENT OF PERSONALITY—I.

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Introduction

PHILIP VERNON has written in his *Assessment of Personality* that if we could but measure even three or four of the chief emotional-social and character dimensions and half a dozen or so of the chief interests and social attitudes we would probably be able to make as accurate predictions about personality as we already can about abilities by means of a short battery of ability tests. It is, of course, a commonplace observation among teachers that scholastic attainment depends as much on a pupil's approach to school subjects as on his innate capacity; in short, temperament, interest, personality, character, attitude and motivation, as well as ability, have to be taken into account in assessing a child's future progress in school. Unfortunately, although there is a growing volume of work on personality assessment, there is a striking discrepancy between the contribution that educational psychologists have made to this field and to that of the measurement of ability.

The study of personality is, of course, as old as human curiosity, and it has been the main concern of literature and the arts throughout the ages. From Greek times philosophers have attempted to systematise temperamental differences, and the Hippocratic fourfold division into sanguine, melancholic, choleric and phlegmatic still colours thought and language. During the present century, following the work of Freud, Jung, Adler and others, problems of personality maladjustment have largely become the province of psychiatrists concerned with the treatment of the mentally ill. The development of this branch of psychology has been haphazard rather than scientific; it has been a rich field for quackery, intuition, and global insights, as well as for men of the genius of Freud, whose psychoanalytic concepts have made a major contribution to world thought. But the work of the psychiatrist is largely conditioned by individual cases and circumstances. He has to take into account such matters as Mr. Jones' Saturday nights and Sunday mornings and his reactions to the price of eggs. The scientific control of social situations and behaviour is neither possible nor desirable when the main purpose is the alleviation of human suffering.

Advance along systematic lines has to be left to psychologists with facilities and time for research, and the opportunity to work with properly controlled samples of persons and personality traits. There are many different approaches to personality study within psychology. For example, Holland and Lindzey, in their book *Theories of Personality*, published in 1957, include chapters on Freud's psychoanalytic theory; Jung's analytic theory; the social psychology theories of Adler, Fromm, Horney and Sullivan; Murray's Personology; Lewin's Field Theory; Allport's psychology of the individual; organismic theory; Sheldon's constitutional psychology; stimulus-response theory; and Murphy's biosocial theory, in addition to the factorial theories on which the present article is based.

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All these approaches have played an important part in recent work by psychologists on the nature of personality. The statistical method of attack described in the present article is only one among a dozen or so possible approaches to the subject, although in the opinion of the author, it is likely to prove the most fruitful in the long run.

Let us first define the term personality as it is used in personality *measurement* as distinct from the general psychological study of personality. Personality is usually held by psychologists to refer to the whole person. A common type of definition begins with the words, ' Personality is the sum total of,' and then proceeds to a list of innate dispositions, impulses, appetites, instincts, tendencies, habits, etc. Prince, for example, says that " personality is the sum of all biological innate dispositions, impulses, tendencies, appetites and instincts of the individual and the acquired dispositions and tendencies acquired by experience." Allport defines it as, " The dynamic organisation within the individual of those psychophysical systems that determine his unique adjustments to his environment." The Gestalt psychologists prefer this type of definition and object to the statement that an individual is merely an aggregation of parts, since this fails to take into account the integration of the complete personality. They regard a person as a ' whole,' but other psychologists have taken the view that science is necessarily analytical. Guilford has pointed out that, " It is humanly impossible for us to compare one ' person-as-a-whole ' with another ' person-as-a-whole '. The act of observation of a single person is an analytical process, as is the act of observing anything. Things, including persons, are known by their properties. An object is round, or sharp, or hard, or all of these things. A person is observed to react promptly, or vigorously, or accurately or in all of these ways." Certainly, for purposes of personality measurement, the term ' personality ' is usually taken to refer to the sum total of a number of discrete social and emotional qualities such as stability, liveliness, perseverance, carefulness and sociability, i.e., to traits based on the *way* in which an individual behaves in his social environment.

Scope of the present articles

This series of articles will be concerned only with the measurement of personality variables or traits, i.e., with certain social and emotional qualities that have been isolated and assessed by quantitative methods of analysis. The distinction between these characteristics and attitudes, interests and values, is rather ill-defined, but a social or vocational or educational psychologist would nevertheless have no difficulty in distinguishing between scales drawn up to assess personality and other characteristics. There is a common usage of terms such as interest and attitude to describe a given set of items, although different psychologists prefer to draw up different formal definitions.

Further, this series of articles attempts to deal with the relationship between measured personality and school attainment rather than with the emotional development of individual children. Both aspects are of great importance, but the study of the emotional development of children covers a wider field than personality tests, questionnaires and ratings, and requires a detailed and expert examination of the circumstances obtaining in each individual case. It is unwise for anyone other than a trained child psychologist or psychiatrist to attempt to ' analyse ' or treat children. A rigorous examination of the child's whole social background is essential. On the other hand, the school teacher has an expert and first-hand knowledge of children's scholastic attainments and capacities, and he can help a great deal in investigations into the relationship between attainment and personality. Teachers have traditionally had to take children's attitudes to the school, to classwork, to other children and to the teacher into account, and it is clearly desirable that they should take an active part in research in this field.

Lastly, we have concentrated largely, although not entirely, on the British educational system, without extended reference to results obtained in America, since much of the schooling given in this country is radically different from that in the United States.

The general development of personality testing

The general strategy in research work on the assessment of personality has followed lines similar to those adopted in investigations into the nature of ability. The first task is to make a thorough survey of this area of psychology by examining the whole range of personality variables; the second, to establish the major dimensions (in the statistical sense) by means of factor analysis (correlational studies), i.e., to see which personality traits go together in the individual to make up the major factors; and the third, to attempt validation of the results by comparing them with the behaviour of people in everyday life. The largest contributions to personality assessment have been made by Eysenck, in Britain, and by Guilford and Cattell in the U.S.A. Cattell has carried out the most ambitious programme and in order to place recent work on the measurement of personality in British children in its proper setting, a very brief summary of his work is given below.

To begin his study of the personality field, Cattell carried out comprehensive surveys of previous research and literature. This is described in his book *The Description and Measurement of Personality* and the reader will best appreciate the huge scope of this work by reading it himself. Allport and Odbert have listed some 4,500 terms in the English language describing mental traits. By bringing together terms which the average user of the language would consider synonyms, Cattell found that this list could be reduced to about 160 terms. These formed a kind of basic English for the complete description of the personality. He next carried out in turn researches in the three main media for testing the personality, namely:

(1) ratings of people's behaviour in everyday life, made by other persons who are well acquainted with them, e.g., by fellow students in a University Hall of Residence;

(2) questionnaires concerning emotional and social reactions: e.g., Have you ever been afraid of the dark? Do you look forward to going to parties?

(3) objective tests, usually carried out under laboratory conditions, in which a person is set a task involving the personality, e.g., memorising under stress, or playing poker.

Ratings of everyday behaviour are, in some respects, the most important of these methods of assessment, as the ultimate criterion of personality differences is how people behave in society, not how they claim to behave according to a questionnaire, or how they perform in standard tasks in a psychological laboratory. Cattell, therefore, turned his first attention to ratings, by searching the literature for factor analytic studies of the personality. For ratings there were 22 studies available (one of them by Cattell) involving 4,000 subjects and the extraction of a total of 88 factors. In Cattell's own investigation the subjects were 240 undergraduate women students in an American state university, living in sororities and independent houses. They were rated by their peers on 35 basic personality traits and 10 ' factors ' were extracted, as follows: Neuroticism, Cyclothymia, Perseverance, Dominance, Surgency, Intellect, Extraversion, Sophistication, Bohemianism and Excitability. [Factor analysis is a statistical method used for revealing the major influences underlining large numbers of observations, such as test scores. It was employed in this country by Sir Cyril Burt, Sir Godfrey Thomson, Professor Vernon and others to analyse the mental abilities.]

Cattell's work on ratings published in 1948 was an attempt to establish the major personality dimensions in the same way that Thurstone in 1938 had analysed the primary mental abilities. But it is obvious that future research cannot be confined to ratings, since, first, it is a highly laborious and inconvenient method. Secondly, it is not usually possible to find enough observers who are sufficiently acquainted with the subjects to make reliable judgements. Thirdly, the social environment is complex and cannot be adequately controlled. No two persons have precisely the same environment; students living in the same hostel, taking the same course of study nevertheless lead quite separate lives with a completely different sequence of experiences, and contacts with other persons. Fourthly, we clearly need a method of attack using ratings as a guide, but capable of more rigorous psychological and statistical analysis, and objective in the sense that all psychologists award the same scores for the same responses. At a later stage in research we thus have to study the personality under conditions which can be systematically varied and brought under experimental control.

Cattell, therefore, next examined 19 factor analytic studies of personality questionnaires, involving 4,800 subjects. There appeared to be 22 major personality factors in this material. Questionnaires suffer from certain disadvantages, of which the chief is that subjects can sometimes (but not always) fake their answers in order to give the psychologist whatever impression they wish about themselves, or they may be very unreliable judges of their own characteristics and deceive themselves easily. A third stage in personality research following the study of ratings and questionnaires is, therefore, the construction of objective, i.e., unfakable tests, which can be administered under standardised conditions in the same way as ordinary mental tests, but which nevertheless measure the major personality traits that characterise people in everyday life. About 60 factor analytic studies (five of them by Cattell), based on scores for over 8,700 subjects were taken into consideration. Twenty-three factors similar to those obtained for ratings and questionnaires were obtained from the examination of these data.

This work, which was published in 1946 (and which resembles in scope Spearman's somewhat less systematic survey of the cognitive field in his book *The Abilities of Man* of 1927) is based on the examination and collation of the findings from over 100 factor analytic investigations and the results for about 22,500 subjects. Cattell first tentatively hypothesised some twenty-five major personality factors, but the number has subsequently been reduced to fifteen, on the basis of more recent research first published on ratings in 1947, questionnaires in 1950 and objective tests in 1951.

Rating Techniques

The development of personality measurement in this country is perhaps best appreciated by first considering in order, ratings, questionnaires and tests, and finally by assessing the validity and practicability of these measures for the teacher and the educational administrator. The present section is concerned with rating methods. These suffer from several drawbacks. When rating others, we are, in fact, recording person A's reactions to person B's behaviour, with double opportunities for error. Unless stringent precautions are taken, ratings are of little practical value.

The following steps should be taken in order to secure reliable and valid ratings.

(1) *Length of observation*

The rater should live with the subject, e.g., in a college, or be in constant social contact with him, and be able to observe him for a long time so that he is seen in many roles and situations. The period of observation should be at least two or three months (preferably a year), so that the rater can observe the subject in a number of unusual emotional situations. There is some evidence that rating reliabilities may go down as time is increased from, say, a few hours to several days, but reliability will rise again as the length of acquaintance is extended to periods of months and years. Persons seen briefly, as in an interview, usually assume a special role. Typically, the next fifty to a hundred hours of observation are spent in revising first impressions, and during this period the reliability drops, but high reliabilities of the order of ·90 are sometimes found with judgements based on long periods of time.

(2) *Definition of traits*

The personality trait to be assessed, such as ' perseverance,' should be clearly defined and exemplified by a list of ' critical incidents.' The judges, in short should have training in recognising, distinguishing and uniformly recording the traits they are asked to rate.

(3) *Use of normalised scores*

In order to avoid errors arising from differences in scatter among the ratings of different judges, it is advisable to express the ratings as ranks, and then to convert these to normalised scores by means of percentile tables, since a normal distribution can usually be assumed to be the most probable distribution of a complex, multiple-determined trait. This method equalises the mean and scatter for the scores of different judges, but not for different individuals or traits.

(4) *Number of judges*

Each subject should be rated by at least four, and preferably by twenty judges, whose assessments are averaged. The reliability of ratings increases rapidly with increase in the number of raters, for the obvious reason that individual prejudices and lack of knowledge due to special personal relations with the subjects tend to cancel out. (It has been shown that statistically each new rater acts as an additional item when lengthening a test, i.e., the increased reliability follows the Spearman-Brown prophecy formula.)

(5) *Stereotypes and Haloes*

It is desirable to reduce stereotype and halo effects (giving a dog a bad or good name, and marking the same person up or down on several characteristics):

(*a*) by having, in some traits, the ' desirable ' pole, e.g., stability, rated high (e.g., ' 5,' with ' instability ' ' 1,') and in others the ' undesirable ' trait, e.g., neuroticism, rated high;

(*b*) by having *traits rated one at a time*, thus centring attention on the behaviour rather than on the individual. One of the most effective methods of minimising halo effects is to make the assessments on one characteristic for the whole class of children, using slips of card on which are written the children's names and sorting these into the five categories, comparing the groups as they are formed. This procedure is far less conducive to ' halo effect ' than the assessment of one child at a time on a number of characteristics.

(*c*) Murray has pointed out a ' contrast ' error in ratings. This is a tendency for a rater who is himself toward one extreme of a trait to rate others more toward the other extreme. For example, a person who is himself extremely orderly and meticulous may tend to see and to rate others as lacking in these qualities.

(*d*) Biases may also exist in the opposite direction, that is, there may be a ' similarity ' error in rating. We often expect to find that others are like us in many respects. Landis found that tall raters tended to overrate the height of others, and emotionally unstable raters tended to overrate instability in others. The old saying that ' misery loves company ' perhaps applies in cases such as the latter.

This recommendation to assess one trait at a time throughout the groups is given in the N.F.E.R. handbook and also by many L.E.A.'s, but in spite of this, a very large proportion (roughly 90%) of teachers who were interviewed in connection with an N.F.E.R. survey by Walker said that they never used this method. A large number admitted that they had never even tried it and one thought that it was "just another psychologist's fad " (is 32° freezing point on a thermometer "just another physicist's fad? "). Some teachers said, " I prefer to consider the individual child as a whole," illustrating the confusion of thought which mixes up integrative methods of assessment suitable for clinical or diagnostic purposes and psychometric measures which require the isolation of single characteristics for statistical treatment.

(*e*) It is best if a day or two elapses between single-trait ratings. This is highly important, and a necessary precaution that is frequently ignored by amateurs, with the result that they tend to give the same child a good or bad name several times in succession.

(6) *Independence of judgement*

The raters should be discouraged from discussing the subjects, since independent evaluation generally leads to considerably higher validity and reliability than team decisions, which tend to reflect the judgement of the team's more dominant members. Teachers making ratings of their pupils' behaviour in school can usually meet the above six requirements, except in respect of the number of judges. On the whole, it is best to confine the experiment to observers who know the subjects well, since two (say) teachers who are well acquainted with their pupils are more likely to make valid assessments, i.e., good predictions of their future behaviour, working by themselves than if they add the ratings of a third teacher who does not know the children well.

Ratings can take several forms. We can attempt simply to give numerical grades, say 1 to 5, or a percentage, or a mark out of 10 or make a mark on a graph and so on. Dr. Johnson is said to have been pleased at being assessed 20 out of 20 for Morality, although he was chagrined at receiving 0 out of 20 for Good Temper and Manners. Perhaps the two grades were not completely independent. Some modern referees even consider that their pupils have *no personality*. Psychologists rarely attempt to use more than seven or so grades, and five is probably the highest number of categories that can be used with efficiency.

There are many pitfalls for the untrained rater. For one thing, he tends to avoid the lower grades, thus reducing the discrimination of the scale; an A — E scale, for example, in which there are no E's is in effect an A — D scale, just as most examiners never award an A + mark, leaving it for the first Shakespeare or Newton they examine thereby lessening the sensitivity of their marking scale for everyone else. It is thus better to force raters to use a relative rather than an absolute scale. In selection procedures at the War Office Selection Board, grades of A (top 10%), B (next 20%), C (middle 40%), D (next 20%) and E (bottom 10%) were used. This method has the advantages of increasing discrimination and of approaching the normal (bell-shaped) distribution to be expected for all complex human characteristics based on large samples of persons. Another way in which the difficulty of biased distribution may be largely overcome is to give verbal descriptions of the statistical range such as Grade I, definitely above average, Grade II, average, and Grade III, definitely below average.

Examples of rating scales

The most reliable rating scales for children used in Britain are perhaps those of: (1) Fleming; (2) Schonell; and (3) N.F.E.R. Fleming (1954) has devised a 5-grade scale for the use of teachers, each grade being subdivided into + and —, making 10 points in all. She suggests that the traits assessed should be persistence, concentration, initiative, sociability and response in class, with a distribution very roughly approximating to 2%, 23%, 50%, 23% and 2%. Foundation Record Card, described by Walker, provides for ratings on stability, persistence, conscientiousness, co-operation and self-confidence.

Schonell has a rating scale for temperament for which he gives the following instructions.

(1) Rate a pupil in each trait by making a cross on the line at the point which you consider most accurately signifies his characteristics in that trait.

(2) Consider each trait separately, disregarding all others.

(3) Carefully read the description and type situations relating to each trait as given below.

(4) Consider each pupil in relation to other children of the same age.

Test 1

Self-Confidence

Extremely confident, amounting almost to 'cocksureness'	Very confident of own powers. Self-reliant	Confident	Lacking in confidence. Timid	Extreme lack of confidence. Over-dependent. Declines responsibility

Description

Self-confidence

In the positive form, this is indicated by self-reliance, ability to face difficulties, a feeling of assurance, ability to carry on independently and a readiness to take responsibility. In games and physical activities it is shown by boldness and courage. In its negative state it takes the form of timidity, doubt, over-dependence and lack of assurance.

The child who has confidence tries to proceed with a minimum amount of guidance; the child lacking in confidence must be aided constantly. The former likes to see what he can construct or produce after instructions are clear; the latter requires spoon feeding and actual assistance with his projects or problems.

Type situations

(1) Is he afraid of the dark?

(2) Can he look after himself (in personal habits) and his own possessions, or must he have people always helping him?

(3) Does he travel in a tram or bus by himself? (only pertinent in the case of children over nine years of age).

(4) Does he talk freely to new visitors?

(5) Is he good at games? Can he swim?

(6) Does the pupil answer with ease and assurance during oral lessons?

(7) Is the pupil good at dramatisation and reading in front of the class?

(8) Does he tackle new tasks well or does he constantly ask his companions and the teacher?

' Graphic ' scales are often considered to be an improvement. In the scale below of Cattell's H.S.P.Q. (High School Personality Quiz) the rater marks the spot with an X.

A	Warm-hearted	Average	Aloof
C	Stable	Average	Unstable
D	Phlegmatic	Average	Excitable
E	Aggressive	Average	Submissive
F	Lively	Average	Glum
G	Persistent	Average	Casual
H	Extraverted	Average	Shy
I	Sensitive	Average	Tough
J	Co-operative	Average	Selfish
O	Anxious	Average	Self-confident
Q2	Self-sufficient	Average	Dependent
Q3	Self-controlled	Average	Undependable
Q4	Tense	Average	Calm

Kay used verbal descriptions based on Cattell's traits as follows:

Introversion-Extraversion

The extravert reacts more readily to the outside world. His behaviour and thinking are habitually governed with reference to his companions and the people around him. In contrast to the aloofness of the introvert, he is warm and sociable in his relations with others. He is likely to be ' thick-skinned ' and outwardly confident. In his work he is inclined to be less serious and adopt a happy-go-lucky attitude. He is talkative in class, whereas the introvert is difficult to ' draw out.'

Anxiety-Stability

The anxious boy is intense, excitable and serious, particularly under stress. In class he is likely to be easily upset, moody when corrected and prone to cry. He is particularly likely to show signs of stress when confronted with a new subject or situation, and will probably be timid at games. On the other hand, the boy who is rated high for stability is tough and placid, insensitive to criticism and unaffected by new, unfamiliar situations. He is stolid in his general approach to work and in his social relationships. The Haggerty-Olson-Wickman Behavior Rating Schedule is an attempt to assess maladjustment in children. It comprises a series of graphic scales for rating thirty-five common traits. By analysing the numbers of well- and poorly-adjusted children who received each particular rating, a table of maladjustment indices has been derived. This scale can be used by teachers without special training in psychology, and it has the advantage that it is not necessary to assess personality disorders but only some of the more acceptable social and emotional traits.

Another type of scale is represented by the Vineland Social Maturity Scale, which contains 117 items, such as:

Reaches for familiar persons ..	(4 months)
Dries own hands	(2½ years)

Each item has been proved to be typical of the average (American) person of the age indicated. Unfortunately, this scale can be applied only by trained examiner who obtains the required information in an interview with a parent or someone else who knows the subject well. He checks the items that apply and works out a Social Age and Quotient in the same manner as a Binet Mental Age and I.Q.

The use of ratings in schools

Ratings have been little used in this country. The tendency is for each research worker requiring rating to make up his own items and most of them tell us more about the researcher's personality than the subject's. The variables chosen are not based on large-scale research work, such as that carried out by Eysenck, Thurstone, Guilford and Cattell, and merely assess fragments of the personality. We do not yet know which traits are positively correlated with success in school, and it is premature for educational research workers to choose their own variables, and thus prejudge the results, according to traits that the investigator hopes are relevant on *a priori* grounds. More seriously perhaps, other important variables which have been well-established by previous research are set aside in favour of the experimenter's private insights. Intelligence testing was at this stage in the last century. Moreover, if each investigator invents his own picture of the human personality, the findings in different researches cannot be directly compared, verified or rejected. In consequence, our knowledge of the personality, in so far as it is derived from ratings is as scrappy as our knowledge of ability would be if psychologists made up their attainment scales according to their personal views on the nature of ability, and ignored the work of Burt, Thurstone, Vernon, Thomson and others. Sir Cyril Burt says that " the traits to be assessed should be, as far as possible, mental abilities or character traits recognised in psychological research, not the vague entities or abstract nouns of popular description, which often designate an obscure compound of several traits varying more or less independently of one another . . . " Complex psychological problems such as the relationships between personality and school attainment cannot be solved by common sense and everyday experience, although in the initial exploratory stages these have a vital role to play.

The result of large-scale surveys by Cattell, Eysenck and Guilford, covering a decade of intensive and comprehensive research, suggest that the two main personality dimensions in both children and adults are (1) *neuroticism-stability* and (2) *extraversion-introversion*. It would, therefore, seem advisable to base teachers' ratings largely on these two variables. At the primary school neuroticism is most likely to show as nervousness, a tendency to show off, to tell lies and show ' spoiled child ' behaviour, whilst extraversion is likely to appear as friendliness and a willingness to co-operate with the teacher. In the secondary school, whether grammar, technical or modern, these traits will also be related to academic achievement, stability appearing as perseverance, conscientiousness and effort, and introversion as a studious disposition and a liking for books and academic pursuits.

Now as psychological research has shown, neuroticism and extraversion are quite separate traits and different pupils may show them in quite different degrees. *A* may be both highly industrious and of a studious disposition, *B* may be neither, being fickle and non-academic, while *C* may be a sticker although not much suited for intellectual pursuits, and *D* may be just the opposite being bookish but thoroughly dilettante and unreliable. By using rating scales based on these two major traits that are in keeping with the main trends of personality research we are more likely to arrive at fruitful and practicable findings which are of value in the everyday work of the school, just as teachers who are cognizant of the overall structure of the abilities are more likely to assess their pupils' school work on a realistic basis.

It is true that the N.F.E.R. survey described by Walker has discovered that the two most common traits assessed in British schools are perseverance and sociability which correspond very roughly to stability and extraversion, which indicate the two most important personality traits. The tortuous process of common sense and experience is thus slowly stumbling up the asymptote of truth. However, as the N.F.E.R. report points out, at the normal age of selection for secondary education, perseverance is not always a very highly developed quality in many of the brightest children, and a high degree of sociability may be a disadvantage from the point of view of scholastic success. Is it right to assume that, of two children equally matched in intelligence, the more persevering will make the better grammar school candidate? Is there not a possibility that *at the age of* 11 a lack of perseverance may be a natural concomitant of a lively and curious mind? These are typical problems that confront the practising schoolmaster and they cannot be scientifically investigated unless we have standard tests of perseverance and sociability comparable to, say, Moray House Intelligence tests, the National Institute of Industrial Psychology's tests of mechanical and spatial ability, or the N.F.E.R. attainment tests.

Allport states that, " there are approximately 18,000 terms (chiefly adjectives) in the English language designating distinctive and personal forms of behavior " and he gives some 150 examples beginning with the letter ' a '. Compared with such a list, the collection of nearly a hundred nouns and some sixty adjectives, found in the N.F.E.R. survey of records kept by local education authorities in this country is not particularly impressive, but even this number of terms emphasises the practical difficulties of analysing and assessing qualities of behaviour satisfactorily.

The N.F.E.R. conducted an enquiry into the keeping of school records. Under the general heading 'personality' were grouped all those sections of the records which deal with information about the child himself, other than that specifically concerned with intellectual ability and attainment, health and physique, or environmental influences. This is the sense in which the term is generally used on school record cards, and in addition or alternatively, the following headings appear:

Personal Qualities

(1) Special Characteristics
(2) General Behaviour
(3) Temperament, or Temperamental Qualities
(4) Development
(5) Disposition and Characteristic Moods
(6) General Attitude
(7) Personal Habits.

The enquiry showed that the number of Local Education Authorities making no provision for recording information about personality are: Infants 65%, Junior 39%, Secondary 54%, i.e., roughly half the authorities made no provision at all at any stage for recording 'personality' information. If comments about the children's personalities are not preserved on the cumulative record, there is little likelihood that they will be preserved anywhere else, and if information about personality is considered to be important, then the absence of a cumulative record with a section for such assessments or notes is a real loss. At the 11+ age, Yates and Pidgeon found that about three-quarters (73%) of the authorities stated that they instruct their teachers to take into account such information as they possess concerning their pupils' home backgrounds and qualities of character. 20·5% instruct their teachers *not* to take these factors into account. The remainder issue no instructions on this point.

The N.F.E.R. sent a questionnaire to the Local Education Authorities concerning the possible uses of assessments of personal qualities. The main points from the replies were as follows:

(1) *Diagnosis*

In cases of backwardness or maladjustment, diagnosis of the cause might be considerably assisted by a knowledge of the child's behaviour and development over the preceding years. Information of this kind might show long-standing weakness in some particular kind of reaction, or might show a turning point which could be related to other, possibly otherwise unsuspected, causes. (The value of personality assessments for clinical use is severely limited in the opinion of the writer, but there is no reason why they should not give useful pointers to action, in the same way as any other external assessment. Objective tests, and possibly standardised questionnaires, might give very valuable information.)

(2) *Value to the teacher*

A knowledge of previous assessments of ' personality ' may help a teacher, as soon as the child comes to the class, to utilise quickly strong, useful characteristics, forestall the development of undesirable ones, and encourage desirable ones, which may be only weakly developed, without a period of delay for the personal discovery of such characteristics.

(3) *Prediction*

If a child's normal mode of behaviour has been consistent, a teacher may be in a position to predict the probable course of the child's development, and in particular make an estimate of his chances of success in some specific form of education. Marked variability of behaviour, or instability, may also lead to a prediction of ' trouble ahead ' unless remedial measures are instituted.

With regard to grammar school selection, it is generally agreed that the extent to which a child is likely to be successful in school depends not only on his level of ability or the standard of attainment that he has reached by the time he leaves his primary school but also on various personal qualities. His capacity for concentration and for persistent effort, his adjustment to the school environment, the degree of confidence that he possesses in his own ability, the breadth of his interests and his liking or disliking of school life are all important factors. Admittedly, as long as there is competition for grammar school places, there is a strong argument for allotting them to pupils who not only have ability, but who have already demonstrated that they know how to use it, and are willing to do so. This, however, is not a good reason for making the possession of certain character qualities a criterion for entry to grammar schools. It may be argued that the grammar school should at least have the chance (some would say the right) to train such qualities of character, when they are lacking, as will enable the child to use his abilities to the full. Moreover, it seems reasonable to stress character qualities in selection at the border line, where children are known to be of grammar school capacity, and where the written examination has failed to discriminate adequately between them. On the other hand, no child who shows the *requisite ability* should be denied the opportunity of taking a grammar school course on the grounds that he lacks certain of the personal qualities that are regarded as desirable or even essential, for academic success. It is possible that an alleged lack of persistence may be due to boredom with the restrictions of the primary school course, and he may be regarded as apathetic when, in fact, the stimulus provided by a new school might release unsuspected energy and enthusiasm. Unless the qualities that are assessed can be shown to be stable there would seem to be little justification for taking them into account.

Some objections to ratings

A common objection to using trait ratings for educational purposes, is that, although the assessments' in terms of traits may classify and grade the children's behaviour, they give no indication of its causes, and may group together children who are basically very different, although they may show superficial resemblances. This criticism shows a complete misunderstanding of the nature of scientific measurement. The study of the causes of children's behaviour is a separate problem. No two persons, for example, have identical mathematical ability, simply because they have the same examination marks, their eyesight is not the same because they have identical opticians' cards; no two rooms have the same atmospheric conditions because their barometric pressures are identical. Assessments of personal qualities, like any other quantitative measures used in science have to be accepted and validated as they stand. Their underlying structure is an important, but different, consideration, and a matter in psychology for the clinical psychologist. It is important if fifty introverts show a significant tendency to have higher academic attainment than fifty extraverts, even if the introversion has a different background in all fifty cases.

Another objection to ratings is that, although in some children at least, certain forms of behaviour have become characteristic and predictable by the time they reach school age, nevertheless, much of the childs behaviour is a reaction to immediate circumstances, and may be expected to vary according to social contacts with different children, teachers, or in different places and circumstances, e.g., home and school. This is no doubt true. Psychological qualities vary a great deal according to the situation in which a person finds himself, but on the other hand, they do not vary at random. Personal characteristics have some measure of consistence, as well as variability. There may well be circumstances in which General Montgomery would be more introverted than Clement Attlee, but they are probably few. It is safe to predict more withdrawn behaviour from Attlee than from Montgomery in the future, and it would be nonsense to predict the opposite, or to say that no such differences can be successfully predicted.

Another difficulty lies in the nature of the distribution of personal qualities. One local education authority (according to the N.F.E.R. survey) expects 5% of its junior school children, i.e., 2 or 3 in each class, to be 'totally unreliable, quite irresponsible; a cheat—faithless and deceitful; untruthful—an habitual liar; dishonest—guilty of petty thieving; frequently blames others for his own misdeeds; rarely carries out duties or observes rules'. Some of the characteristics assessed in school records are determined almost entirely by cultural or environmental influences, and in these circumstances it is not realistic to expect, say, only 30% of the population to be co-operative! It is the descriptive phrases used on school record forms which are misleading and distort the natural normal(ish) distribution, which is almost certain to be found for any complex psychological characteristic.

Research into school ratings

The N.F.E.R. inquiry into selection, conducted by Yates and Pidgeon, asked teachers for ratings of their pupils' persistence, sociability and self-confidence, choosing these three traits because they appear frequently in record cards used by local education authorities. Questionnaires were also devised for use with a borderline group in which typical manifestations of these qualities were described and the teachers were asked to indicate for each pupil whether they had observed this kind of behaviour frequently, occasionally or hardly at all. Neither the teachers' ratings of these qualities, nor the description of behaviour, yielded a satisfactory measure. Yates and Pidgeon came to the conclusion that there are as yet no means available to education authorities of effectively identifying and assessing the personal qualities that influence a child's chances of success in a grammar school course. In fact, the N.F.E.R. recommends that an authority that deems it appropriate to include judgements of personal qualities in its procedure for allocation would be well advised to invite its teachers to make a global assessment of overall suitability for grammar, technical or secondary modern schools. The teachers with whom this problem was discussed were unanimous in the view that expert guidance was essential and that it should be conveyed by means of illustrations of concrete items of behaviour rather than by definitions in abstract terms.

In the N.F.E.R. enquiry on school records, it was found that in Junior schools, where it is possible to compare children of all levels of ability, the correlations between school work assessments and almost any ' personality ' quality was uniformly about ·6. That is, there appeared to be a fairly strong tendency for assessments of personal qualities to go with good ability in school work. These correlations are fairly high, but they are probably due largely to ' halo ' effect. The results were as follows:

Comparison of Persistence Rating with Second Year School Work

Persistence Rating	*N* (78)	*Percentage in Upper (School Work) Group*	*Percentage in Lower (School Work) Group*
12 and above ..	.. 50	80·0	20·0
11 and below ..	.. 28	50·0	50·0

It is clear that there is a substantial relationship between the personality measures and the criterion (the tetrachoric correlations are about +·60), but it must be remembered that these assessments may provide little *additional* prediction when added to a battery of more orthodox selection tests. Evidence on this point is essential. More convincing evidence would be significant correlations between objective tests of ability and attainment.

MacClelland describes a research in which teachers were asked to grade all pupils in regard to industriousness. He found correlations of +·598 (boys) and +·647 (girls) with I.Q., and +·568 (boys) and +·664 (girls) with attainment. The high correlation with I.Q. suggests considerable ' halo ' effects. The study also showed that the girls were more industrious than the boys, although the difference was not very great. The good boys were nearly as industrious as the good girls, but the boys of poorer ability were less industrious than girls of the same type. On the whole, if it were not for the regrettable fact that the observed relationship between personality assessments and school attainments may be largely due to halo effects, the overall correlations of the order of size of +·6 would be extremely satisfactory, and little inferior to those obtained by tests of ability. But since they add little *additional* prediction to estimates of attainment, they have little practical value. The results of attainment tests given at 11+, particularly those of the ' old-type ' and essays may well act as incidental measures of those personality traits which are relevant to success in the secondary school.

Thorpe and James investigated the relationship between teachers' ratings of adjustment and maladjustment, and maladjustment and more objective estimates obtained by psychological testing. Three groups of 36 children were studied—a group of the most adjusted, a group of the least adjusted and a normal group selected at random. Objective tests of neuroticism, which had been shown previously to distinguish between neurotic and normal children, were found, with the exception of the sociometric test (the children's liking for one another), not to differentiate between these three groups. It seemed likely, in fact, that the teachers were making their judgements on the basis of extraversion rather than neuroticism. Hallworth has shown, however, by analysis of the intercorrelations between another set of teachers' ratings that their judgements were based on two dimensions similar to Eysenck's and Cattell's two major factors. They can be named (1) ' extraversion ' or (2) ' reliability and conscientiousness ', i.e., stability. Kay found correlations between teachers' estimates and Cattell's personality factors of +·76 (Extraversion) and +·46 (Anxiety) in one school, but of only +·15 (Extraversion) and —·08 (Anxiety) in another school, in which the children were not so well known to the teacher. This suggests that only those teachers who know their pupils well should rate them; any attempt to increase the number of raters is unwise.

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CRIME, CAUSE AND TREATMENT: RECENT RESEARCH AND THEORY

by Leslie T. Wilkins

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MOST people have the impression that crime in general and juvenile delinquency in particular has increased rapidly during the last few years and is today a very serious problem indeed. Is this impression correct? If so, what can be done about it? Certainly the number of 'crimes known to the police' was, indeed, in 1959 (according to the most recent figures available, given in *Criminal Statistics, England and Wales*[1]) the largest ever recorded in our history.

But as Huff points out in his admirable textbook *How to Lie with Statistics*[2] "averages and relationships, trends and graphs are not always what they seem. There may be more than meets the eye or there may be a great deal less." Huff records that the official figures for encephalitis in the Central Valley in California in 1952 showed triple the figure for the worst previous year. Many alarmed residents "shipped their children away. But when the reckoning was in, there had been no increase in deaths from sleeping sickness. What had happened was that the state and federal health people had come in in great numbers to tackle a long standing problem, and as a result of their efforts a great many low grade cases were recorded that in other years would have been overlooked, possibly not even recognised." Can there be a similar phenomenon underlying crime statistics?

In considering this, it is useful to examine rather more closely the background of the figures for crime. It is, of course, immediately apparent that the police do not become aware of crimes by some mysterious process of 'knowing'; nor do they get to know about them by direct observation if the criminals are able to avoid it. Crimes 'known to the police' are usually reported to them by the public, most frequently by the victim. This means that an event must first of all be *defined by a member of the public* with no special legal knowledge, as a crime, *and* as a crime such as to justify his telling the police about it. Now the legal definitions of 'crimes'* are clear enough but extremely wide in scope. For example, the value of a stolen article is not relevant to the legal definition of larceny; robbery with violence may involve nothing that the lay citizen would classify as violence at one end of the extreme limit of the definition, while at the other end the worst possible headline story would fit the same legal category.

Few children have not been fortunate at some time in finding some small coin or other apparently discarded article which they have retained and in consequence are guilty of larceny by finding. On the other hand, vandals could do very considerable damage to your car, but the incident would not be recorded as a 'crime'* unless the damage done amounted to more than £20; but if instead of damaging your car they merely opened the door and removed a small packet of cigarettes from the glove pocket, they would have committed a crime of larceny from a vehicle. Legal definitions of *crime* are intended for use in legal processes and are doubtless adequate for those purposes, but they are not directly translatable into sociological indices. Included in what is usually regarded as normal behaviour are some acts which are crimes by legal definition, but at the extreme end of a distribution are crimes which all sane persons, even offenders themselves regard as such.

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*For purposes of 'crimes known' only indictable offences are considered.

Crime is a human action, and it is convenient to try to set up a verbal or mathematical model of actions which will help in discussions of the question of whether crime has or has not increased. It is possible to picture human actions as forming a frequency distribution, a continuum from very saintly acts to the most sinful. There are very few extremely saintly acts committed in the world, and there are very few extremely sinful acts, the majority of our actions are just simply normal. In fact it does not seem unreasonable to postulate that if we could measure the degree of saintliness or sinfulness of actions, the ethical content would be normally distributed in much the same way as we arrange intelligence measurements to be normally distributed.

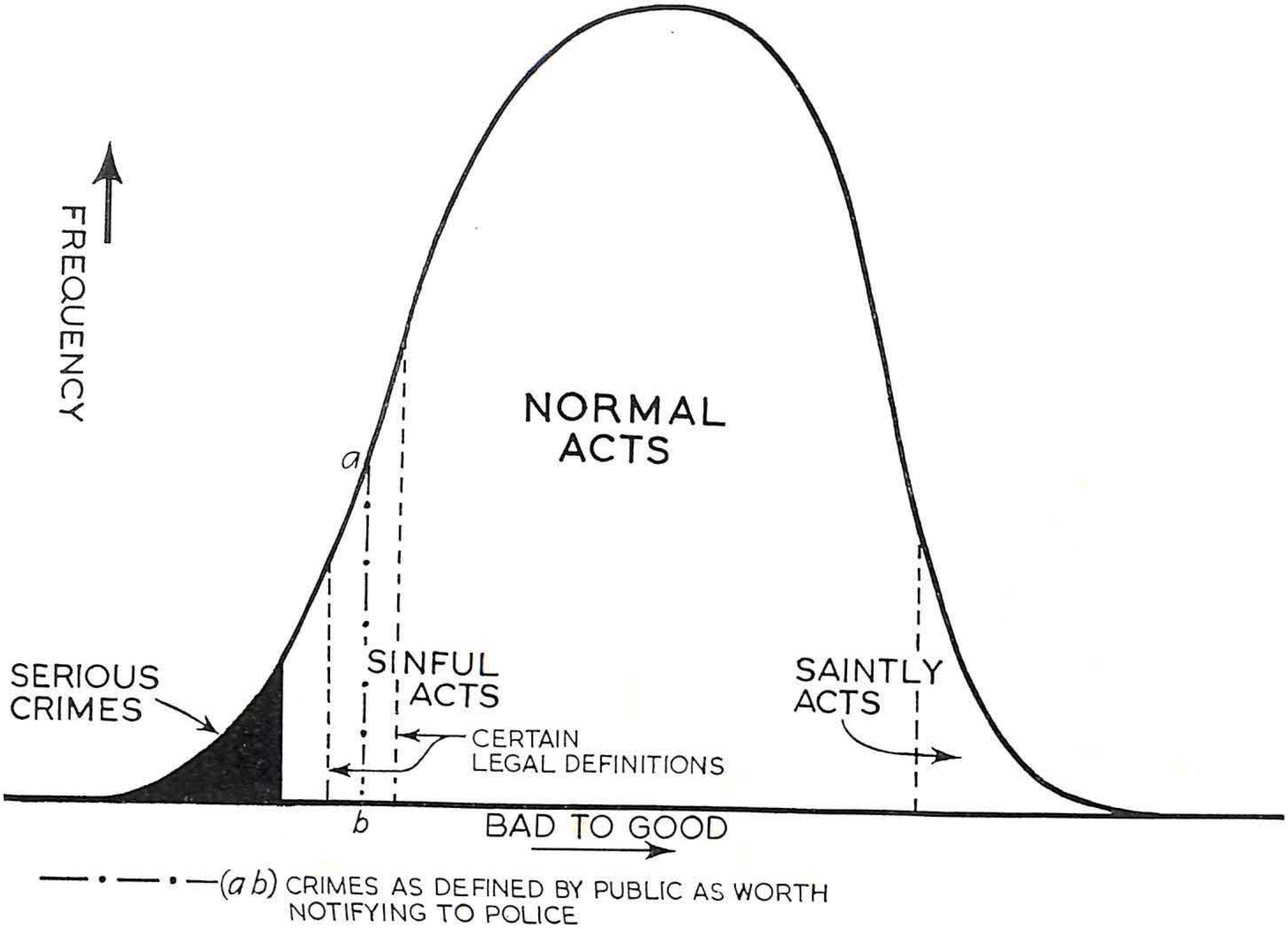
A diagram of the familiar distribution is given as figure I.

If we now take the mathematical model afforded by the normal frequency distribution shown as figure I, for purposes of argument, to represent the distribution of the ethical content of human actions, crimes will be represented, in the main by actions at the ' sinful ' end of the scale. But the point of cut-off between crime and no crime is of importance in counts of the frequency of notification of crimes known to the police. At this stage it is possible to introduce another ethical consideration. It is often represented that the main ' cause ' of the current ' crime wave ' is the drop in moral values of present day society. No less an authority than Lord Pakenham has expressed such a view. If this argument is not circular, is it a fact that today the average citizen is more likely than in any previous years to become the victim of a criminal attack upon his property or person?

It is known that ' crimes known to the police ' do not include a very large proportion of all the crimes committed. This is because the figures upon which the ' crimes known ' figure is based are derived from the sample of crime which has been reported. That is to say the incident before being included in the ' crimes known ' figure, has to be *both* socially defined as worthy of notification, and defined by the police as a crime in the technical meaning of the term. It would be expected, for example, that quite a few incidents of vandalism are defined by the public as worthy of notification, but are not in fact crimes and do not find their way into the statistics. On the other hand there are many thousands of incidents of shop-lifting which are certainly ' crimes ' but are defined by the victims as ' not worth reporting.' There is, too, considerable scope for social definitions to vary both from place to place and from time to time without any change in the underlying situation.

Any change in the social definition of an event worth notifying to the police will, in completely stable conditions, influence the bias of the sample of crimes represented by the ' crimes known ' figure. It is possible to argue that if our moral standards are improving—that is to say if we are becoming *more* stringent and requiring a *more* conforming standard of behaviour—the definition of the social concept of a crime that should be

Figure I


FREQUENCY
NORMAL ACTS
a
SERIOUS CRIMES
SINFUL ACTS
CERTAIN LEGAL DEFINITIONS
SAINTLY ACTS
b
BAD TO GOOD
(a b) CRIMES AS DEFINED BY PUBLIC AS WORTH NOTIFYING TO POLICE

notified to the police will tend more closely to agree with the legal definition so far as the majority of crimes are concerned, since by far the biggest component in the 'crimes known' figure is that of larceny. In terms of the model of figure I, this would mean that the line *ab*, would move further towards the right so that more of the area under the curve would be taken in. The shape and the size of the curve need not change.

As Lodge[3] remarks "only large changes or persistent trends can be relied on with any degree of safety to have a cause which it is worth while to investigate. There should be borne in mind the possibility of factors such as improved police methods, greater readiness of the public to report the offence, a court decision affecting the name given to an offence, or other such changes." While statistics of crimes are very difficult to interpret, statistics relating to offenders who appear before the courts are recorded with substantial accuracy. Taking a very broad view and using all the information available, it is only fair to say that it is likely that the crude figures of 'crimes known to the police' which have been quoted in many quarters to indicate a substantial increase in crime rates of recent years, do in fact represent a real increase. It is even more certain that particular age groups of young persons are causing justifiable concern.

The Causes of Crime and the Treatment of Offenders

The Criminal Justice Act, 1948, Section 77 (i) b, gave the Secretary of State the authority to incur expenditure "in the conduct of research into the causes of delinquency and the treatment of offenders, and matters connected therewith." The wording of this section is interesting. It separates the concept of the "causes of crime" from the concept of the "treatment of offenders." It has already been noted that it is very difficult to discuss the meaning of 'crime' and almost impossible to measure it. The problem of the causes of crime is a very large, perhaps unlimited, problem. The treatment of offenders although involving some extremely difficult concepts has at least the limitation that an offender is a person! The distinction between the two types of criminological research, that which is concerned with and limited to persons and that which is concerned with a broad and general and perhaps undefinable concept, is important. Let us first consider what is known or believed about the causation of crime.

It is perhaps surprising that with a subject about which the experts know so little, the layman knows so much. Ask any normal citizen about the causes of crime and it is certain that you will get a quantity of positive replies. Ask how offenders should be treated so as to ensure that they do not commit further offences and few will have any doubts about the methods they advocate, unless perhaps they have made a study of the subject! Degrees of certainty of belief in this field seems to be inversely proportional to knowledge of facts. A recent study by the Home Office Research Unit[4] led to the suggestion that children of about five years of age were more likely to be disturbed by war or social upheaval than children of any other age. The *Daily Express*[5] commented on this research. "Home Office Research workers labour on the problem of delinquency among young children. They put forward a great many figures and arrive at a conclusion which will surprise nobody . . ." Similarly *The Daily Mail*[6] commented, "Clever people sometimes go to enormous trouble to reach conclusions which simpler minds have already jumped to." *The Observer*[7], however, remarked that "one of the findings, that

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disturbances around the age of four and five are particularly harmful seems of a doubtful validity." Thus, for some persons the conclusions were obvious without any evidence, and for others, despite the evidence, the conclusions were still untrue!

This state of affairs is typical of the whole field of criminology*. For every theory concerning the causes of delinquency, no matter how strongly held, it is possible to find a contradictory theory equally strongly held. Some persons have, therefore, proposed to do without theory and to 'stick to facts.' But it is not clear what action this might mean without the cement of a theory to hold the facts together. There are, of course, good theories and bad theories, and there are ways of distinguishing them. A good theory can assist the processes of scientific works. Some theories of the causes of crime will be examined mainly to test whether they are good or bad theories—whether or not they fulfil the role of a theory—not whether they are true or valid.

How should we examine a theory? The best theories are concise, elegant summaries of observations; the observations are accepted as sound and they have been subject to replication by different workers. Theory interrelates observation in a common statement. The best way to distinguish good theories from bad is to consider ways of destroying them. In the first place we should examine the theory to see what deductions can be made from it to set up postulates which may be tested either experimentally or by observation of the facts of life. That is to say, the first step in testing a theory is to state the practical consequences of it. If the operational definitions (deduced practical consequences) are proved untrue the theory is discredited. The value of a theory is directly related to its relevance to the particular problem under study, and the consequences and operational definitions which can be deduced from it. No theory can ever be proved to be true; it is held for so long as no better theory can be found. Clearly the greater the number and the wider the scope of the hypotheses and practical consequences that can be deduced from the theory and the greater the number and the wider the scope of the hypotheses which have been or could be tested and which *could* be or *could have been* proved false, the better is the theory.

Two theories of delinquency

The first theory most vigorously put forward in current criminological literature is that of 'multiple causation.' This merely asserts that crime is a function of numerous factors. Examination of this 'theory' by the criteria given above suggests that it is a statement that can hardly be dignified by the term 'theory.' Perhaps to some extent it summarises certain observations, although this is not clear. Proponents of the theory would claim that since research has found no single factor as the cause of crime, but rather many different factors appear together associated with greater or lesser frequency of criminal activity, this is evidence for multiple causation. But the theory does not facilitate the deduction of any hypotheses or practical consequences that are of any help at all. If it is claimed that the theory applies to all factors which are operationally found to be related to criminal tendencies as they become known, it is clear that the theory lacks the major and essential feature of a scientific theory—it is framed in such a way that it is impossible to find any test whereby it could be proved wrong! The theory of multiple causation is, then, no theory. At best it could be an anti-theory which proposes that no theory can be formed regarding crime. Such a council of despair may be legitimately put forward as a kind of ' beatnik ' philosophy, but not as a scientific theory.

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*The analogy between research into the causes of delinquency and research into education is close—pontification is readily based on prejudice and awkward facts are denied or ignored.

A theory which does meet the tests proposed above and which is attracting considerable attention at present is due to Sutherland[8] who states, " a person becomes delinquent because of an excess of definitions favourable to violation of law over definitions unfavourable to violation of law." This is called the principle of " differential association."

This means, in terms of very broad principles that it is believed that when persons become criminal they do so because of contacts with criminal patterns and also because of isolation from anti-criminal patterns; that persons assimilate the surrounding culture unless other patterns are in conflict. From this theory a number of hypotheses can be set up and subjected to test. A recent examination of this theory by Glaser[9] reveals that it is not only a good theory in that a large number of practical consequences (hypotheses) can be derived from it, but that a large number of these have been demonstrated by other research workers to hold up under test.

There are, however, a number of other factors known to apply to some criminals which it is not possible to deduce from the differential association theory. What then should happen to the theory? As James Conant recommends " a conceptual scheme is not to be discarded merely because a few stubborn facts cannot be reconciled; it should be modified, unless it can be replaced by a better one." Is it possible to find a better theory or to modify this one? This question may be examined by reference to some further theories and general conceptual frameworks.

Perhaps the best known work on the gang problem is that by Cohen in *The Culture of the Gang*[10]. The theory put forward in this work is summarised by Kitsuse and Dietrick[11] as follows:

(*i*) " The working-class boy faces a characteristic problem of adjustment which is qualitatively different from that of the middle-class boy.

(*ii*) " The working-class boy's problem is one of ' status frustration,' the basis of which is systematically generated by his early exposure to the working-class pattern of socialisation.

(*iii*) " The working-class boy's socialisation handicaps him from achievement in the middle-class status system.

(*iv*) " Nevertheless, he is thrust into this competitive system where achievement is judged by middle-class standards of behaviour and performance.

(*v*) " Ill-prepared and poorly motivated, the working-class boy is frustrated in his status aspirations by the agents of middle-class society.

(*vi*) " Delinquent sub-culture represents a ' solution ' to the working-class boy's problem for it enables him to ' break clean ' with the middle-class morality and legitimises hostility and aggression against the sources of his frustration.

(*vii*) " Thus the delinquent sub-culture is characterised by non-utilitarian malicious and negativistic values as ' an attack on the middle-class where egos are most vulnerable . . . It expresses contempt for a way of life by making its opposite a criterion of status.' "

Many writers have found difficulties in reconciling this theory with observed facts, even in the U.S.A. It is not possible to state all the objections here, but a modification of the theory is interesting in that it relates in obvious ways with the theory of differential association to which reference has been made earlier. This theory is due to Kitsuse and Dietrick who were concerned with the difficulty in Cohen's theory of explaining the continuance of the delinquent sub-culture. They postulate:

(*i*) " The individual learns the values of the delinquent sub-culture through his participation in gangs which embody that sub-culture.

(*ii*) " The motivation of individuals for participation in such gangs is varied.

(*iii*) " The malicious non-utilitarian and negativistic behaviour which is learned through participation in the sub-culture is met by formal negative sanctions, rejection and limitation of access to prestigeful status within the middle-class system.

(*iv*) " Thus, participation in the delinquent sub-culture creates similar problems for all its participants.

(*v*) " The participants' response to the barriers raised to exclude them from status in the middle-class system (that is the ' problem ') is a hostile rejection of the standards of respectability and an emphasis upon status *within* the delinquent gang.

(*vi*) " The hostile rejection response reinforces the malicious non-utilitarian and negativistic norms of the sub-culture."

Readers may find it interesting to compare the two theories stated above with those of Bernstein in *Educational Research*, Vol. III, No. 3. These theories discuss the learning of values, but do not consider the mechanics of learning. As Bernstein aptly states, the problem is " how the outside gets into the inside." If we can find out something about this, we may be able to intercept the process, analyse it effectively and then find something that can be done about it. Bernstein suggests that language is the main medium. It would appear that there is some evidence in favour of communication factors in some aspects of delinquency in this country. But before they can be considered it is necessary to look at one further theory.

The theories of delinquency which are currently attracting most attention are based on sociological concepts. There are theories which are basically psychological. These are well known, particularly in this country those associated with the work of Bowlby, Andry & Stott. In the U.S.A. sociology and psychology are closer together in terms of their conceptual models and the social psychologists have adapted sociological theories of delinquency to psychological frames of reference. Theories of perceptual processes and particularly the concepts of social perception have particular promise. This is an interesting development and should, perhaps, be noted and illustrated.

It is assumed that all ' knowledge ' is acquired indirectly; man constructs his knowledge by orderly transformation of coded signals, and this process is called cognition. Intuitive directness, whether in perceiving or thinking may result from practice and predisposition, but it is achieved by inferential processes, no matter how short-cut they may become through learning and development. The attempt to identify an approaching figure, to develop an idea, to form a sentence or any other activity, involves selecting or constructing a means appropriate to some end. Our perception is conditioned by experience. Social perception refers to the way in which the world of other people is seen—how people try to make sense of others. Social perception is the process of observing, recording (coding and storing) and organising the experiences one has with other people, groups and social organisations. The term is also used—and this is important—to refer to the way social factors influence observations of one's world. Work in this area is concerned with such matters as how people ' understand ' other people and how they relate this ' understanding ' to adjustments in their own behaviour, how accurately people observe, describe and judge other people and themselves. Differences in ability to perceive are often related to ideas of ' social maturity.'

One theory of delinquency which has been transformed into a perceptual ' model ' is that of ' anomie.' This theory is related to the work of Cohen discussed earlier. The concept of ' anomie ' was first put forward by Durkheim[12] to explain variations in suicide rates. It was a sociological theory but it may be easier to understand and test in its transformed style. The concept is stated by Srole[13] in perceptual terms as follows:

A person having a high ' anomie score ' would perceive:

(*a*) the lot of the average man as getting worse;

(*b*) the future so black that it is hardly fair to bring children into the world;

(*c*) public officials as uninterested in problems of the average man;

(*d*) other people as untrustworthy;

(*e*) life to be lived very much for today—tomorrow to take care of itself.

High ' anomie ' has been related to the criminal gang phenomena of New York and other large American cities. It is argued that ' anomie ' results when an individual is prevented from achieving his objectives, and is in this way related to the ' blocked opportunity ' explanation of the gang. Perhaps in the U.S.A. where all levels of society are attracted by the ' American dream,' where the values sought by all are the middle-class values, ' blocked opportunities ' may be a more valid theory than in this country where most sociologists have reported not excess of ambition among young people, but a disturbing lack of it. Or is, perhaps, the ' American dream ' not universal even in the U.S.A., and is this merely another method whereby the middle-class social workers and researchers project their own value structure to others?

Perceptual process theories are capable of high degrees of generality. For example Fiedler and Kahn, Mannheim and Rabin of the Group Effectiveness Research Laboratory at Illinois[14] have studied particularly ' perception of others,' ' reference groups and membership groups ' and the ' self-image ' and found these to be valuable concepts in relation to working groups in the armed forces, church groups and even groups in prison.

The theories of perceptual processes are related to problems of communication. Perception involves transformation of coded signals (sight, sound) and implies an apparatus analogous with the radio or television receiver. Communication is concerned with both transmission and reception. Market research workers are making very effective use of these theories by exploring ' brand images ' (how brands are perceived) and the use of symbols having various emotional content.

Symbols, images, communication and perceptual processes are likely to have some meaning in exploring delinquent and deviant behaviour. For example, group and individual stress or tension impedes communication and perception. Glaser has recently suggested that the differential association theory would be better if modified to differential identification or differential expectation. While the differential association theory stresses the factor of learning, differential identification allows not only for learning but for modifications of learning through perceptual processes interacting with personality differences.

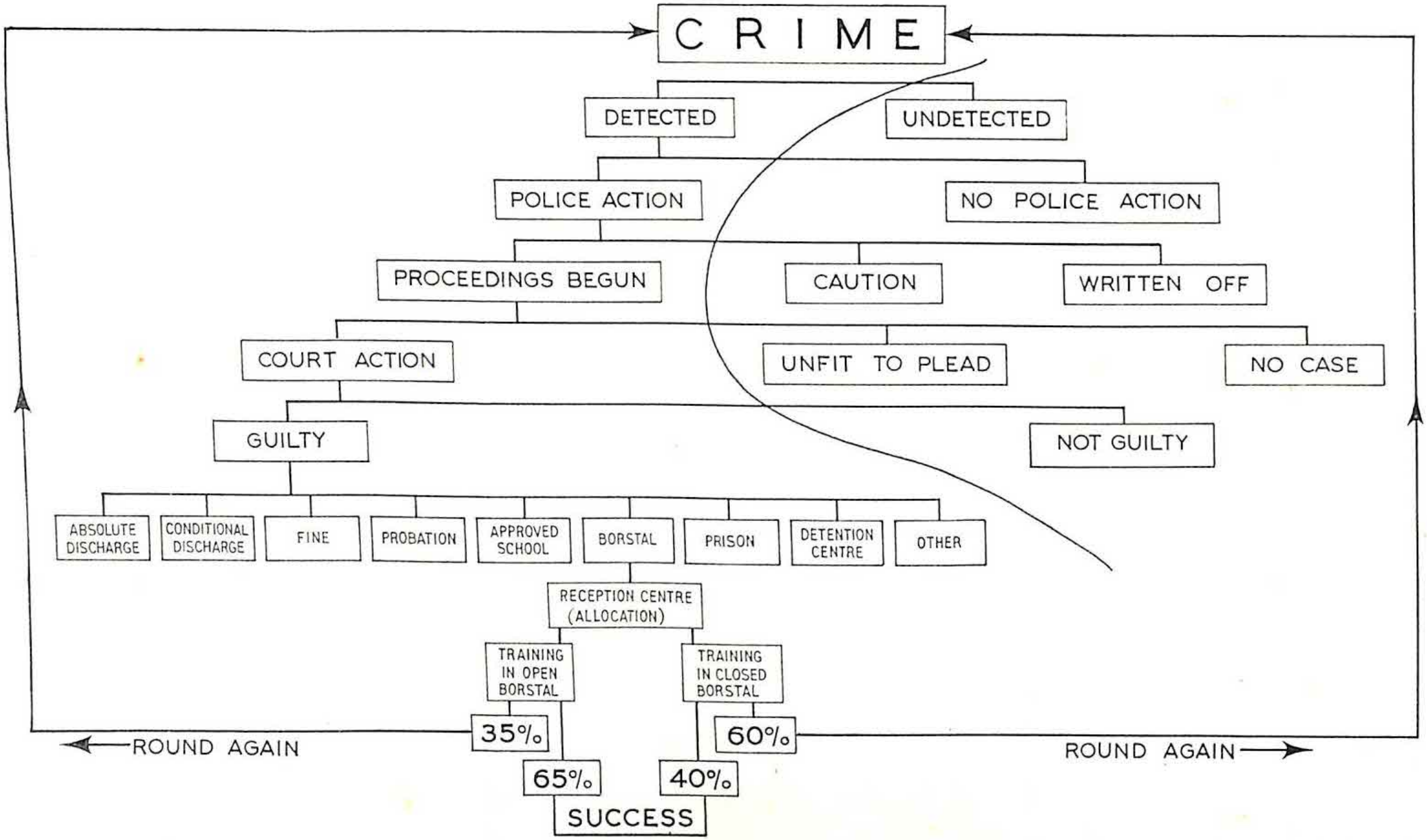
In the Home Office Research Unit report, mentioned briefly earlier, it was shown that youths of between 17 and 21 in 1955 and onwards, who would have been expected because of their years of birth (' delinquent generation effect ') to be exceptionally delinquent, were, in fact even more delinquent than could be estimated by the year of birth analysis. Some other factor peculiarly conducive to delinquency among young men has apparently been operating during the last few years. Although an accretion of effect is another explanation, the most direct inference that can be drawn is that this ' other factor ' had something to do with the fact that about 1955 the young adult males in the particular sub-cultures which give rise to most delinquency, hit upon a ' communication symbol '—a particular form of dress (jeans, drapes and so on). As with any other minority group, symbols of communication are powerful factors in preserving the group. There is no doubt, too, that the easy identification which the dress symbol made possible, both to persons inside and outside the minority group, made the process described above as " formal negative sanctions, rejection and limitation of access " easier to apply by persons outside the group and increased the identification and solidarity within the group. Thus, delinquents became more delinquent.

Theories are attractive, but they are and should be highly vulnerable. The present writer has no wish to suggest that, because he has criticised other theories, the theory he puts forward is more powerful or useful. If this theory can be destroyed, something will have been gained. It does seem, however, that perceptual processes, and the ways in which values are communicated, are useful concepts for research into problems of behaviour, including deviant behaviour in this country.

After the Crime

No matter what action may be taken to prevent crime, it is certain that some persons will continue to commit offences and that society will have to take some action to protect its members. A diagram (figure II) illustrates in broad outline the procedures which may follow the committal of a crime. In respect of one form of treatment—Borstal training for which research information is available—the results of treatment are shown. Roughly one in three of the offenders dealt with in ' open ' institutions committed further

Figure II


CRIME
DETECTED
UNDETECTED
POLICE ACTION
NO POLICE ACTION
PROCEEDINGS BEGUN
CAUTION
WRITTEN OFF
COURT ACTION
UNFIT TO PLEAD
NO CASE
GUILTY
NOT GUILTY
ABSOLUTE DISCHARGE
CONDITIONAL DISCHARGE
FINE
PROBATION
APPROVED SCHOOL
BORSTAL
PRISON
DETENTION CENTRE
OTHER
RECEPTION CENTRE (ALLOCATION)
TRAINING IN OPEN BORSTAL
TRAINING IN CLOSED BORSTAL
35%
65%
40%
60%
SUCCESS
ROUND AGAIN
ROUND AGAIN

crimes within three years, whereas approximately two out of every three of those dealt with in ' closed ' institutions were similarly re-convicted. Clearly the allocation procedure will tend to ensure that ' better material ' is sent to ' open ' conditions. The problem is, whether open treatment is better than closed for the purposes of securing reform, having regard to the type of offender normally trained in the different conditions.

Mannheim and Wilkins[15] were concerned with this problem and attempted a solution by means of ' prediction methods.' These methods enable measurements of the nature of the ' input ' to be made and compared with the results of the ' output.' This is done by setting up a ' discriminant theory model ' at the stage immediately following the sentence of the courts, that is, before the offender is received into the reception centre. At this stage a quantity of information is available which does not, of course, include any reference to the type of treatment to be received.

It is possible to express the ' pre-reception ' probabilities of recidivism as a linear function. This function provides a description of the ' input ' material, and enables that part of the difference in outcome which may be inferred to be due to the nature of the ' input ' to be partialled out. In this particular case, it was found that nearly all the variation in the outcome could be explained by the nature of the ' input ' as described by the equations. That is to say that the outcome of treatment was related almost entirely to the individual and his characteristics rather than to whether he went to a closed or open Borstal. There was, however, a small residual (which was just significant at the 1% level with a sample of 700) in favour of open treatment. This does not mean that open treatment was indicated for all cases—that all Borstals should be open institutions. It is possible to explain the difference in favour of open treatment in terms of an interaction factor which may be of various forms, and which, because of the design of the study, cannot be distinguished from factors of error inherent in the experiment itself.

The general power of the prediction method, however, may be appreciated from the fact that it was possible, using only information available before committal to Borstal, to forecast the outcome of treatment with remarkable accuracy. At one end of the scale, a group of offenders could be identified who were subsequently successful in 87% of the cases, whereas at the other end of the same scale a group with a success rate of only 13% was similarly identified. The main function of the method, however, is to provide a research tool. The efficiency of the tool depends upon the quantity and the quality of the information that can be obtained and used in its construction. Inadequacy of information is the main obstruction to developments in this area of research.

So far the results of studies of this kind, in this country, have failed to show that any one treatment is very much better or very much worse than any other. None of the results can be said to be conclusive. This applies to other methods applied to solving the same problem. A study by the present writer[16] of a matched sample of offenders placed on probation and other offenders dealt with in other ways showed no significant difference in outcome. The report of this enquiry concluded with the statement, " The negative result of this study is challenging. Why did undoubtedly different treatment policies make no difference in the subsequent criminal activity? "

There are several hypotheses which might explain these results. Some relate to the validity of the method of research used. But this seems a doubtful explanation. No solution using mathematical models can, of course, be as convincing as direct experimental methods. In this country experiments involving randomisation of treatment have not been made. In California[17], however, persons placed on parole were released to parole officers having case-loads of from 15 to 90 and some offenders were released three months ahead of their scheduled time. Parolees were allocated at random to parole officers with 15, 30, 60 and 90 case-loads, and whether an offender was released early or not was also randomly determined. A follow-up over two years failed to reveal any difference in outcome.

It is fair to summarise research work to date in the area of treatment as showing that there is no generally good treatment—a treatment which is suited for all types of cases. It seems that it is necessary to examine the interplay between offenders and treatment, rather than to consider treatment as a single variable. The ' treatment ' indicated for different types of offenders may be contra-indicated for others; the problem becomes who should do what, with what, and to whom!

If delinquency is seen to be an ' illness,' then it is necessary to find the nature of the different types of ailment that have so far been classified together. It is now clear that what is meet treatment for one offender is poisonous treatment for another! But as yet only one research has been able to suggest ways of differentiating offenders according to the type of treatment indicated or contra-indicated. This is a recent and costly project carried out by the Office of Naval Research[18] in the U.S.A. Offenders were most intensively studied and classified in many ways, but in particular according to measurable personality characteristics related to the ways in which they *perceived* the world—their reaction to problems of social interaction.

Some were classified as ' socially mature ' others as ' socially immature,' after thorough testing. A rigorous experimental design was used. The classified offenders were placed in three treatment groups, of which two (T1 and T2) made use of intensive ' living group ' therapy; the third (S) was the more usual training of a Naval Correctional Establishment. The results were tested by follow-up. The percentage successes in the three treatments revealed no differences between treatments except when broken down by the type of offender classified by the social maturity scale. The following table shows the percentages not re-convicted:

Offenders Personality Type	Treatment Type T1	T2	S
Socially mature	70	72	61
Socially immature ..	41	55	60
All	59	65	61

The ' S ' type treatment did not, as expected, interact with personality differences, whereas the intensive case work methods did interact; the socially immature were *more* likely to recidivate after this treatment, which was, none the less a better treatment for other offenders. It is interesting also to note that the offenders in the experiment were classified in several other ways by intelligence and personality typologies but it was only the classification based on the conceptual model of *perceptual processes* that proved significant. This experiment represents a big step forward. It shows that something does make a difference. But there are still many problems; this study applied to military delinquents; it relates to American culture patterns, and the typology, although discriminating between treatment (by treatment and personality interactions), may be criticised on a number of grounds. Moreover, it is not completely demonstrated that the differences found were due to ' treatments ' rather than to other things which just happen to individuals undergoing different treatments. We still know very little about the treatment of offenders, but the nature of our ignorance is beginning to be revealed, and this is encouraging.

Potential Delinquents

It may appear that to consider crime from the point of view of the treatment of offenders is to lock the proverbial stable door. However, a large proportion of crime is attributable to persons who have committed crimes before. If recidivism could be prevented the total volume of crime would be reduced to perhaps between a half and two-thirds of the present figures. This would be well worth while. From the point of view of research strategy, it also seems reasonable to spend considerable research effort on problems of treatment. It is very difficult (and frequently raises ethical problems) to obtain information from the population at large, whereas those who have committed offences represent, sometimes literally, a ' captive population.'

Again the treatment of offenders costs society a considerable sum of money. As an interim objective it does not seem unreasonable to consider how money can be saved even if, as yet, we see little promise of being able to save souls. A scientific break-through in one area may lead to a break-through in another area. Once a person has been convicted and found guilty of an offence by due legal process, it is reasonable that society should attempt by various means to help and reform him, and to this end it is ethical for research workers to seek information. To what extent it is ethical to seek the necessary information from persons who have not violated society's norms is a point of dispute. Even if it were possible to obtain such information and to be able to identify a person before he had offended, what action would it be reasonable to take regarding him?

In certain countries, it has been considered to be reasonable to identify high risk children and to attempt to prevent their becoming delinquent. This it is claimed is justified on the grounds of conserving scarce resources. Another system is to identify a high risk *area*, and to attempt social action in respect of the whole of the juvenile population in the zone. The latter strategy seems to have been accepted without much difficulty, whereas the former has resulted in conflict between groups of social workers equally concerned with the welfare of society but taking different views regarding basic individual freedoms and, thus, the ethics of different forms of action.

The Gluecks[19] claim to be able to predict delinquency and to identify among young school children with reasonable accuracy those who are likely subsequently to commit offences. Their claims are somewhat exaggerated, but nevertheless it must be admitted that it would be possible to identify potential delinquents by the use of prediction methods. Such identification could take place at the age of say, 8 or 9 years. Any such prediction methods, however, have two types of error:

(*i*) some children will be predicted to be potential delinquents who will not in fact subsequently become delinquent;

(*ii*) some children who, in fact, do subsequently become delinquent will not be identified.

Whether the two types of error are equal or not in terms of their social consequences does not seem to have been considered. The New York City Youth Board is at present engaged in an experiment to validate the Gluecks method of pre-delinquent prediction and to develop other instruments. This action has led to bitter public controversy between Youth Board and the Citizens' Children's Committee[20]. Confounded with the ethical objections are, in this case, technical objections relating to the two kinds of error involved. Large scale community projects, where a whole area is subject to social action are also currently taking place in Los Angeles, Syracuse, and Flint, Michigan, and possibly in other places. No ethical controversy seems to have arisen with these studies. The main result of interest so far is that no matter what else the social scientists have not discovered in the United States, it must be recorded to their credit, that they have certainly persuaded the authorities that such research should be paid for.

Such projects are extremely costly. The Federal Government agency, the National Institute of Mental Health, itself in one year disposed of \$101,000,000 on social research, and of this the limited field of criminology received the sum of \$1,600,000 of which about three-quarters was classified as going into fundamental research. In addition to Federal Government spending, individual States invest large sums in applied social research. If it is suggested that much of this money is wasted, it is claimed that a certain amount of waste may be necessary in order to provide a climate for the expansion of social sciences as a *national necessity*. If there is no money, or if money is available only for the top research workers, research cannot expand; one way to break the vicious circle, it is argued in Washington, is to put in more money than can be reasonably abosrbed at the present as an investment in the future.

Conclusions

Although very little positive evidence can yet be put forward as to the causes of crime or the treatment of offenders, many beliefs have been shown to be unfounded. There is a beginning of some integration of the various theories, and theories are better constructed than in the past. The practical consequences of some quite powerful theories can be stated and the mechanics for testing them are becoming known. The future looks hopeful. The next few years are likely to prove very exciting for social research even if not as rewarding as may be hoped.

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Educational Guidance:

THE DESIGN, CONSTRUCTION AND USE OF STANDARDISED TESTS

—Part 2: The Interpretation of Test Scores

by D. A. Pidgeon

IN Part I of this series (Pidgeon 1961) an attempt was made to describe briefly the development of a modern standardised test—how it was constructed and how the scores on it were transformed to a meaningful scale and were subject to errors of measurement. Full appreciation of this aspect of the standardised test is clearly important, but it is even more important that the scores derived from such a test should be interpreted in the correct manner and this implies a clear understanding of what the scores mean in relation to what the tests are supposed to be measuring.

Attainment Tests

So far as attainment tests are concerned there would appear to be little problem—reading tests, attainment in reading, arithmetic tests measure attainment in arithmetic, history tests, attainment in history and so on. Even here, however, lack of appropriate knowledge can lead to misunderstanding. Apart from the necessity of appreciating the merits of the scale used for reporting the test scores and of being aware of the tests' errors of measurement, the precise relationship between the content of the test used and the previous syllabus covered by the pupils taking it, must be known before the scores derived from the tests can be correctly interpreted. A high score on a 'mechanical reading' test does not necessarily imply high reading comprehension, and scores on a mathematics or history test, the contents of which only overlap in part with what the pupils have been previously taught, may be quite misleading if they are compared with norms derived from pupils whose syllabuses included all aspects of the subjects covered by the tests. Apart from reservations of this kind, however, modern standardised attainment tests can be accepted as being more scientifically constructed and hence more reliable versions of the more usual type of examination paper familiar to all teachers.

It is clear that the real problem of understanding the true meaning of test scores arises from the use of tests purporting to measure 'intelligence' and it is the intention of this present article to attempt to clarify some of the misunderstandings and misconceptions that have grown up around the efforts of psychologists to measure this quality.

Assumptions underlying 'Intelligence' test scores

It is unnecessary to enter into the various definitions of 'intelligence' that have been proposed (see Vernon 1960). As with electricity it is possible to measure it, and put the measurement to practical use without knowing exactly the nature of what is being measured. Indeed, many of the difficulties that have arisen in the use and interpretation of 'intelligence' tests stem from the acceptance of a definition coupled with the belief that tests are capable of measuring the ability so defined. The word 'innate' for example may be included in a definition of intelligence but a possibly misleading assumption would be made in assuming that what tests are measuring is also innate. This is not to suggest that intelligence (in the everyday use of the word) does not denote something, which, in part at least, is innate, or that it is unnecessary or unprofitable to pursue enquiries into what intelligence really is. In the interpretation and use of scores from tests of ability the practical issue, however, is to define fairly precisely, not intelligence as such, but the meaning of the score obtained.

Nowadays everyone is so well acquainted with the fact that people differ in intelligence, however the term may be personally defined, that the notion that a child may fail at his school work because he is being faced with a task ' beyond his capacity ' is one that is readily acceptable. A teacher who has spent many frustrating months trying to teach an eight year old child to read or master the process of multiplication, is well prepared to believe that, although most children of this age can do these tasks, they are beyond the capabilities, at any rate for the time being, of this particular child. Clearly these frustrating months could have been avoided if the teacher had had some means of ascertaining at the outset that this child was limited in his capabilities compared with other children, and it appears that the means have been provided in the shape of an ' intelligence ' test.

Consider the case of two children, both aged 9 years, and both revealing a very low reading ability—a standardised score, say, of 75 on a test of reading comprehension. It would clearly be of the greatest value to the children's teacher, especially if faced with a class of 40 other pupils, to know whether any special efforts on his part to teach the two to read are likely to be at all rewarding. He applies an ' intelligence ' test—non-verbal, since the children cannot read—and one obtains a standardised score of 100, the other 70. Being cautious the teacher gives a second test which confirms these results. The teacher then reasons that the first child apparently possesses average intelligence and that whatever the cause of his poor reading it is certainly not lack of ability. Efforts on the part of the teacher, then, to find the cause of the difficulty and apply remedial techniques may well result in success. The second child is, however, manifestly dull and there is no need to look any further. Although poor, his present level of reading is all that can be expected and it is unnecessary to take any remedial action.

At this point we should note the basic assumption implicit in this line of reasoning. We may agree that children cannot perform tasks beyond their capabilities; and this may be translated as saying that capacity must necessarily limit output, or to use a much quoted analogy—it is impossible to pour more than a pint out of a pint pot. So far the words ' capabilities ' and ' capacity ' have been used, although ' intelligence ' could be easily substituted, accepting any one of the many definitions that has been formulated for this entity. However, when we move from ' intelligence ' to a score on a test of ' intelligence ' we make the further assumption that ' intelligence ' tests are yielding a direct measure of this entity—that is, a measure of the ' capacity ' of a child. It is, in fact, strictly true to say only that the ' intelligence ' test used by the teacher is giving a measure of the children's ability to answer the non-verbal perceptual type of items of the test, in the same way that the reading test was giving a measure of their ability to read sentences with comprehension. Both are dealing with present *function*. Viewed in this way, the non-verbal test is no more yielding an indication of *capacity* (innate or otherwise) than is the reading test itself. Hence, although the teacher may be praised for taking remedial action for the wrong reason with the first child in the example, we must surely condemn the assumption that the second child cannot also benefit from his special help.

The Mathematics of Test Scores

The important point being made here is that ' intelligence ' tests do not yield measures of capacity—they do not and *cannot* indicate the true limits of performance in actual attainment. All teachers are familiar with examinations; many, perhaps, are not so familiar with the fact that examining necessarily implies measurement. For all measurements it is necessary to have two statistics—a zero point from which to start measuring and a unit with which to make the measurement. In the measurement of length, for example, the zero point is in fact absolute zero—no length, and the unit is arbitrarily defined as the yard, metre or some other measure according to the country of origin. In the field of mental measurement a difficulty is experienced immediately—there is no absolute zero point. If an examination or test were made in which some children scored zero, it would always be possible to make another easier one on which the same children now achieved a positive, though low, score. Exceptions to this rule are possible, for example, in the area of spoken vocabulary, but for practical purposes they can be ignored. To overcome this difficulty it is usual to adopt as the zero point from which to start measuring, the mean or average of the scores obtained on the test or examination, and the score of any particular child is then referred to as a deviation from this average, above or below. It will readily be seen that the actual score which denotes the average will depend upon the difficulty of the items in the test and the performance of the children on whose results the average was calculated. For any given test the average will vary according to the level of performance of the children taking it. In most physical measurements, such as height or weight, comparability between any two independent measurements can be ensured by the use of the same units and by making the measurements from the same reference point—zero. For the scores on any two mental tests to be strictly comparable, they must bear the same relationship to their respective averages (i.e. similarity of unit) and the averages must be derived from the same, or very similar, samples of children (i.e. the same reference point).

We may now consider an ' intelligence ' test, given to a representative sample of children and yielding an average score which, on the familiar scale of standardised scores, would be made to equal 100. Similarly, we may consider a test, or series of tests, of attainment, given to the same or a similar representative sample of children, and yielding an average score which, on the same scale, would also be made to equal 100. The differences between the averages, by definition as it were, is zero, and this is the same thing as saying that the average of the differences is zero. In other words, if, for each child the difference between his standardised scores on the ' intelligence ' and attainment tests was considered, the average of these differences for all children would be zero. This means that to counterbalance those children whose attainment test scores fall below their scores on the ' intelligence ' test, there will be an approximately equal number of children whose scores on the attainment tests *exceed* their scores on the ' intelligence' test, and this implies, if the ' intelligence ' test is regarded as measuring capacity, an approximately equal number of

' over-achievers ' as ' under-achievers.' Now, the concept of the ' under-achiever ' is only too easily appreciated, but what is the educational or psychological explanation of the ' over-achiever ' ? Is this really a case of more than a pint being poured from a pint pot or is the notion that ' intelligence ' tests measure capacity wrong?

The relationship between the scores on two tests

Another way of presenting the argument, but in rather more concrete terms, is to consider the relationship between the scores on any two tests. It will be readily appreciated that, if the correlation between any two tests is known, then, given a child's score on one, it is possible to predict the most likely value of his score on the other, or at least, to define, with reasonable confidence, the range within which his score is likely to fall. In statistical terms this range is usually taken as plus or minus twice the standard error of the difference between the scores on the two tests. If the correlation is perfect, then the range is zero—the score on the second test can be predicted with certainty, it is the same as the score on the first test. As the correlation diminishes so the range increases until at the other extreme, with a zero correlation, it is in fact the full range of test scores—a score on the first test giving no indication whatever of the likely score on the second.

Table I below gives the most likely value on one test (Test B) and the lower and upper limits of the range defined by twice the standard error, for a set of scores obtained on another test (Test A), for each of four different values of the correlation coefficient between the two tests.

It will be noticed that for high and low values of score on Test A, the most likely score on Test B is not the same value but in each case one which is nearer to the total sample average of 100. The reason for this is the phenomenon known as *regression* and it arises from the fact that low scorers, for example, on the first test, if they change their score on the second test have a much greater opportunity to change in an upward direction than in a downward one. The child who is bottom on the first test cannot occupy a lower position on the second, although he can improve. The opposite, of course, occurs with high scorers on the first test—they can more readily move downwards than upwards. It will be observed that the regression effect increases as the correlation decreases.

The meaning of the figures in Table I can perhaps be best illustrated by considering a group of children all obtaining a standardised score of 70 on Test A. If it is known that Test A correlates 0·6 with Test B, then the majority of these particular children would obtain scores on Test B clustering around 82. Some, however, will obtain a score as high as 106, some as low as 58. Indeed, 5% of them will obtain scores outside this range, that is above 106 or below 58.

So far these tests have only been referred to as A and B. A further meaning can be given to the figures if Test A is now considered to be a test of, say, mechanical arithmetic, and Test B, a test of reading comprehension. The correlation between two such tests will vary somewhat according to the nature of the tests and possibly the age of the children taking them, but the value will not depart radically from 0·7. All teachers know that individual children vary in their relative performances on these two subjects and will not be unduly surprised to find that some children who were average for arithmetic (i.e.

Table I

Range of Predicted Score on one Standardised Test from Different Levels of Score on another Correlated Test

Test A—Mean 100; S.D. 15 **Test B**—Mean 100; S.D. 15

corr. = 0·90
S.E. = 6·60 2S.E. = 13·20

Score on Test A	Score on Test B		
	Lower Limit	Most Likely Value	Upper Limit
70	60	73	86
80	69	82	95
90	78	91	104
100	87	100	113
110	96	109	122
120	105	118	131
130	114	127	140

corr. = 0·80
S.E. = 9·00 2S.E. = 18·00

Score on Test A	Score on Test B		
	Lower Limit	Most Likely Value	Upper Limit
70	58	76	94
80	66	84	102
90	74	92	110
100	82	100	118
110	90	108	126
120	98	116	134
130	106	124	142

corr. = 0·70
S.E. = 10·65 2S.E. = 21·30

Score on Test A	Score on Test B		
	Lower Limit	Most Likely Value	Upper Limit
70	58	79	100
80	65	86	107
90	72	93	114
100	79	100	121
110	86	107	128
120	93	114	135
130	100	121	142

corr. = 0·60
S.E. = 12·00 2S.E. = 24·00

Score on Test A	Score on Test B		
	Lower Limit	Most Likely Value	Upper Limit
70	58	82	106
80	64	88	112
90	70	94	118
100	76	100	124
110	82	106	130
120	88	112	136
130	94	118	142

scoring 100) obtained scores as high as 121 or as low as 79 for reading. They may well be concerned to improve the reading of those scoring 79 or even to improve the *arithmetic* of those scoring 121.

A somewhat different interpretation is often employed, however, if, instead of arithmetic, Test A was called an 'intelligence' test. The children scoring 79 on the reading test are clearly 'not working up to capacity,' while the scores of 121 would probably be viewed with suspicion and presumably no effort would be made to improve the *intelligence* of the children obtaining them. It must be remembered that the figures given in Table I are based on empirically determined evidence of the correlation between two tests. It is true that a verbal 'intelligence' test may correlate higher with reading than 0·7, but the value is unlikely to be much above 0·8. What is important is that the figures apply whether both tests measure attainment or whether one is concerned with 'intelligence' and the other with attainment. There is clearly no evidence that the scores on an 'intelligence' test possess any special attribute to distinguish them from those on an attainment test, or to suggest that they can imply a limit to attainment test scores.

The concept of 'under' and 'over' achieving

Enough has been said by now to make it clear that the nature of mental measurement is such that it is impossible for a score on an 'intelligence' test to indicate the limit of score that could be achieved on attainment tests. However, the concept of 'under-achieving' is undoubtedly real and it is interesting to speculate why the belief that the scores from an 'intelligence' test would reveal the under-achievers, should have been accepted in the face of evidence that the same scores would also reveal the anomalous over-achievers. The answer in all probability is that the latter were never found because they were never looked for.

Historically, the growth of the psychology of individual differences in the latter part of the 19th century and first part of the 20th and, particularly in this country, the stress placed by Spearman, Burt and others on the differences in inherited ability, lead naturally to such statements as Burt's (Burt 1937):

> "Intelligence, as psychologists use the word, is almost synonymous with what the Board of Education, somewhat uneuphoniously, has called 'educable capacity.' Capacity must obviously limit content. It is impossible for a pint jug to hold more than a pint of milk; and it is equally impossible for a child's educational attainments to rise higher than his educable capacity permits. In theory, therefore, we should always expect his educational age to fall below his mental age. In practice, however, when standardised tests are applied, the former is found to exceed the latter in a few rare instances."

If 'intelligence' tests were measuring 'educable capacity' then over-achievement was virtually impossible—and why look for the impossible? It is interesting, however, to speculate again why 'over-achievers' did not turn up, even though they were not looked for. The answer is, of course, that a few were found, but were attributed to faulty testing or to some exceptional circumstance. The reason why larger numbers were not revealed was probably due to comparisons being made on tests standardised on different samples, and to the natural concern of educators for the dull and backward child.

The early 'intelligence' tests described performance in terms of mental age—a concept that is easily understood by teachers and others and indeed is still used today. Now, chronological age is a measure on an absolute scale (that is, like length, it is measured from an absolute zero point—no age) and because mental age is described in the same units (years and months) it was easy to assume that it was also an absolute measure and hence that the difference between chronological and mental age or the ratio of mental age to chronological age, the I.Q., was also absolute—that is, had the same meaning in all circumstances. But mental age is no more than a raw test score and is subject to the same variations as any other test or examination scores. A mental age of 8 years is no more 'real' or 'absolute' than an examination score of 45%. However, the belief that it was led to comparisons being made between different 'intelligence' and attainment test scores which in reality were not comparable. A mental age of 10 years, for example, was thought of (and unfortunately still is by many people) as being as 'real' as a chronological age of 10 years, instead of being approximately equal to the average performance of the sample of 10 year old children on whose scores the test was standardised. Similarly, attainment ages were regarded as being 'absolute,' instead of being related in the same way to the sample on which the tests were standardised.

It follows, therefore, that only if the two standardisation samples employed were closely similar can comparisons in fact be made between the 'intelligence' and attainment scores. If the standardisation sample used for the 'intelligence' test included rather more below average children than did the attainment test standardisation sample, then the scores subsequently derived from the 'intelligence' test would tend to be above those from the attainment test. And this situation often occurs. In the construction and standardisation of individual 'intelligence' tests for example, deliberate attempts are made to produce norms from samples fully representative of the total population and this means the inclusion of the correct proportions of children who are educationally subnormal or even feeble minded (see e.g. Wechsler, D., 1949). But attainment tests are invariably standardised on representative samples of normal school children and the very dull tend to be automatically excluded.

It must be admitted that such differences in standardisation are unlikely to be very large and an examination of the differences between 'intelligence' and attainment test scores for a large group of children would reveal a sizeable minority of 'over-achievers,' although certainly not equal proportions of 'over' and 'under' achievers. (See example in Table XIX, page 177, Burt 1921). However, such examinations are rarely carried out since attention is, for obvious reasons, more usually directed to backward children, or those thought to be in need of remedial education. Now children referred to remedial centres, say, for reading, form a selected group — at the very bottom of a distribution for reading. If these children are now given an 'intelligence' test because of the effect of regression, their scores on this test will tend to be higher and most of them will appear to be 'under-achievers.' Indeed, if there are also errors of standardisation it would not be surprising to find that 'over-achievers' are very rare. It will, of course, be appreciated, that if children at the upper end of the distribution for reading had been given an 'intelligence' test, a large number of 'over-achievers' would have been found.

Constancy of the 'I.Q.'

It is not the purpose of this present article to enquire into the various reasons why measured intelligence should have come to be thought of as a fixed entity that is largely inherited. An excellent account of the development of the 'capacity theory of intelligence' has been given by Daniels (1959). It is relevant to note, however, that the idea of the constancy of the I.Q. stems directly from the belief that 'intelligence' tests are measuring innate capacity. Regarded in this way, intelligence must remain constant and therefore variations in test scores or I.Q. can only be due to deficiencies in the test used. That 'intelligence' test scores do not remain constant can be clearly demonstrated by reference to the figures in Table I; the correlation between the same or very similar 'intelligence' tests, given with intervals of a few years, is usually no greater than ·8 and drops well below this value when the interval is increased or when different kinds of 'intelligence' tests are used (Vernon 1955A). Constancy of the I.Q. implies, of course, that correlations approaching 1·0 should be obtained with any interval of time. It is quite clear that 'intelligence' test scores are affected by 'environmental' factors to no small degree and numerous researches have been carried out demonstrating this. (See bibliography in Clarke & Clarke 1958).

What are 'intelligence' tests measuring?

It may seem to be a legitimate conclusion from the above account that if 'intelligence' tests are not of any value for measuring 'educable capacity' they have no use at all. To anyone accustomed to the 'capacity' theory of intelligence and who has attempted to use the difference between 'intelligence' and attainment test scores to reveal the 'under-achievers' such a conclusion may appear inevitable. Certainly it is the present writers opinion that it is better to abandon completely the use of such tests rather than to use them in the wrong way. Far better that attempts should be made to discover the difficulties of all non-readers and to explore every possibility of teaching them to read without recourse to 'intelligence' testing, than to abandon all efforts for some of them because they apparently reveal an innate dullness by obtaining very low scores on 'intelligence' tests.

But such resignation is not justified. The point was made earlier that it is unnecessary to define intelligence in order to use 'intelligence' tests; it is necessary, however, if the tests are to be used correctly, to understand a little more clearly what they are measuring. It is suggested in order to do this that an operational viewpoint be adopted or, in other words, that the score from an 'intelligence' test be interpreted in terms of what the test contains or in terms of empirically determined facts known about it.

This is not just a re-statement of the old definition—'intelligence is what intelligence tests measure.' In fact, it is desirable at this stage to sever completely the connections between what is understood by 'intelligence' and what is measured by 'intelligence', tests and it would probably help in this necessary separation of ideas if 'intelligence' tests were not so called.

The view taken here is that all tests measure intelligent behaviour whatever titles they may be given. A child answering the items in a reading 'attainment' test or in a mechanical ‘aptitude’ test or in a non-verbal ‘intelligence’ test, is displaying intelligent behaviour albeit different aspects of it. And each of these aspects has its own importance.

Thus it should be clear that a child who obtains a standardised score of 70 on a non-verbal test involving the ability to discover relationships between diagramatically presented material, should not be classified as ‘unintelligent’ even though it may be called an ‘intelligence’ test. Rather, he should be noted as being, on the occasion tested, decidedly below average (in fact only better than the bottom 2½ % of the sample on which the test was standardised) on a non-verbal test involving the ability to discover relationships between diagramatically presented material. Whether this knowledge is of any use to the teacher obtaining it depends upon what evidence there is relating the scores on this test to something meaningful to the teacher. It may be mentioned in passing that, so far as most ‘non-verbal’ tests are concerned, there is very little evidence indeed to show that they have any value at all outside of research. (Vernon 1958).

But for other kinds of ‘intelligence’ test—especially those involving items of ‘verbal reasoning’—evidence of the kind required is available. There is, for example, a large body of research showing that the ‘verbal’ or ‘verbal reasoning’ test is the best *test* predictor, at the age of 11, of secondary school success. (Emmett 1942, Rutter 1950, Wrigley 1955, Yates & Pidgeon 1957). It is interesting to note the reasoning employed in describing the use of this test in 11+ selection. It is *not* said that because a child obtains a high score he is intelligent and will therefore succeed, or that a child with a low score is unintelligent and will therefore fail, but that there is empirical evidence to show that children with a high score stand a relatively high chance of succeeding, and children with a low score stand a relatively small chance of succeeding. No reference is made to the intelligence of the children and moreover this view enables a perfectly rational explanation to be made of low scorers who do eventually succeed.

Care should be taken not to regard this evidence of the high predictive value of verbal tests at the age of 11, as evidence of the value of other ‘intelligence’ tests for predicting future attainments. Recent follow-up studies carried out at the Foundation clearly show, for example, that the best predictor at age 8 of reading at age 10, is a reading test (correlation = ·8). Non-verbal tests at 8 only correlate about ·5 with reading at 10, and moreover no significant relationship is found between non-verbal test scores and improvement in reading.

The demonstrated success of the 11+ verbal test probably arises from the fact that the ability required to answer it successfully has a great deal in common with the ability required for working successfully in most school subjects. In other words, the average correlation between verbal tests and all other attainment tests is higher than that between any one attainment test and all others. Thus, if it is required to put children into relatively homogeneous groups, e.g. for streaming, this can most easily and successfully be achieved by using a verbal test. There will, of course, be considerable overlap between ‘streams’ formed in this way, but it will be less than if the streaming had been carried out be means of attainment tests alone. The overlap to be expected is not inconsiderable; Vernon (1955B) has estimated that in a three-stream primary school, roughly 10% of the children would require up-grading or down-grading a stream every year. (See also Daniels 1959).

The fact that verbal tests correlate relatively highly with general attainment also means that they are useful where it is required to match or compare different groups of children. This has specific value in research, but a teacher in a new school may wish to know how his present children compare with those he has been teaching. An examination of the mean and distribution of scores on a verbal test given to both groups will tell him this quickly, although more useful information could eventually be obtained by giving separate attainment tests.

In demonstrating the inadequacy of the ' educable capacity ' theory of intelligence testing, a certain stress has been laid on the similarities between ' intelligence ' and attainment tests, in particular that both kinds of test are measuring learned intelligent behaviour. It may, however, be argued that there are also certain basic differences, for example that while attainment tests are measuring the intelligent behaviour that has resulted from direct teaching, ' intelligence ' tests attempt to measure what has been learned indirectly. The difficulty here is that this is by no means a clear distinction; arithmetical problems are to be found in ' intelligence ' tests and typical ' intelligence ' test item types, such as analogies and classifications are often to be found in attainment tests (Pidgeon & Yates 1957). Moreover, what one child has not been taught directly, another may well have been.

Perhaps a better distinction, and one which is more in keeping with the operational viewpoint being suggested here is the difference in the area of intelligent behaviour covered by the two kinds of test. It can be supposed that there is an infinite variety of situations in which intelligent behaviour is demonstrated. (See Brimer 1956). Attainment tests cover only very specific areas or groups of ' situations ' (e.g. the items in a reading comprehension or mechanical arithmetic test), while for ' intelligence ' tests a wider area is covered. The area covered by group verbal tests is nevertheless somewhat limited and although it overlaps considerably with school attainments (giving rise to the relatively high correlations mentioned earlier), it overlaps much less with other areas of intelligent behaviour. Individual ' intelligence ' tests may be said to ' sample ' the ' infinite variety of situations ' to an even wider extent, but even so, the adequacy of the sampling is dependent upon cultural determinants. In other words, the content of any particular ' intelligence ' test constructed for a Western culture, will only contain a sample of the intelligent behaviour of that culture and will be useless for cross-cultural comparisons (Vernon 1955A). Even within a culture, there may exist differences of opinion on the adequacy of the ' sampling,' since, being infinite, it is impossible to define precisely the population from which it is drawn.

Viewed in this way, a score on an ' intelligence ' test could be regarded, but only with due caution, as indicating the average level of performance in the wider area of intelligent behaviour covered by the test; and being an average it cannot indicate the score to be expected in any specific (attainment) test in that area any more than a knowledge of a batsman's average in cricket predetermines his score in his next innings. It should be appreciated, moreover, that averages can be improved by improving component scores, whether the latter were originally high or low. While it is dangerous to pursue analogies like this too far, it can be observed that there is no law which says that component scores should ideally be equal to the average.

Theoretically there may be an upper limit to the possible score that could be achieved by any child on any test, but this limit is unknown (and, with present knowledge at least, unknowable) and since obtained scores must either be equal to this theoretical limit or below it, the only safe assumption is that it is possible to raise *all* scores. It must be realised that an ' intelligence ' test score no more estimates maximum potential than does an attainment test score; *both* are subject to the influence of factors likely systematically to depress them below a theoretical maximum. In other words, if, by effort of improved instruction, the level of intelligent behaviour called for in specific attainments can be raised, then it is an equally acceptable viewpoint that the area of intelligent behaviour covered by ' intelligence ' tests can also be raised. If a low attainment score relative to an ' intelligence ' test score is interpreted, therefore, as indicating the need to raise the attainment concerned, so also, must a low ' intelligence ' test score relative to an attainment score, be interpreted as indicating the need to raise the ' intelligence '—or more specifically perhaps, to improve the kind of intelligent behaviour covered by the ' intelligence ' test. And it is not meant by this that children should be coached to answer ' intelligence ' test items any more than they should be coached to answer attainment test items. Rather, they should be taught to act and think intelligently in all situations, in or out of school.

In conclusion it might not be inappropriate to sound a note of warning. The belief that scores on ' intelligence ' tests can indicate the level of performance to be expected in attainments may well have the effect of keeping the attainments of some children below what they could be, for ' intelligence ' test scores may be interpreted as ' expectancy ' scores and once a child is found to be ' working up to capacity ' there is a danger that no further efforts will be made to improve his attainments. Children at all levels of ability and attainment will be affected by this complacency, but the danger is perhaps greatest with the dull and backward, for dullness (i.e. low ' intelligence ' test scores) becomes interpreted as a *cause* of backwardness instead of being merely concomitant with it.

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Research Note:

TEACHERS' VIEWS ON PRIMARY SCHOOL STREAMING

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THERE has recently been increased discussion of streaming in primary schools, and useful articles with good bibliographies have appeared. But we are still very frequently referred to Australian or American research because of the shortage of British studies, and of course this comparison of schools enclosed within quite different cultures becomes delicate, difficult, and sometimes impossible to make. In the present situation even fragments of fieldwork in British schools can be valuable, and this must excuse the incompleteness of the present note. It reports a very small piece of work done for the Institute of Community Studies, and is merely preparatory to a fuller enquiry into primary school streaming.

It seemed a useful thing, before we defined this final project, to seek a few more facts and ask some teachers' opinions on the subject. We therefore sent out 50 questionnaires to primary school teachers. The sheets were distributed for us by the National Foundation in Surrey, by the Nottingham Institute of Education, and the Leicester Department of Education. It seems reasonable to presume that amongst teachers in contact with these centres there was an unusually large proportion who were sceptical of streaming—and these results may be biased accordingly. No claims are made for the finality of the findings at any point: they are offered only as hints and suggestions—openings that might later be more strictly investigated.

Of the 50 class teachers, 11 taught A streams, and 10 taught B streams. 16 taught mixed ability groups in schools too small to stream, but large enough to provide one class for each age group. The remaining 13 took classes in schools so small that not only was streaming out of the question, but they had to teach children from different age groups together. There was no example of a school large enough to stream, but which did not, in fact, stream.

The teachers were first asked to place the children in one of five social groups according to their father's occupation. Doubtful occupations were described and allocated according to the Registrar-General's Classification of Occupation. The results are set out in Table I.

Table I

Father's Occupation	A Stream		B Stream		Mixed ability classes in small schools		Mixed age classes in very small schools		Social composition of surrounding local population	
Professional and Managerial	21%	37%	6%	21%	12%	25%	8%	15%	6%	24%
Clerical	16%		15%		13%		7%		18%	
Skilled Manual	31%	63%	24%	79%	25%	75%	44%	85%	52%	76%
Semi-Skilled Manual	21%		27%		28%		25%		16%	
Unskilled Manual	11%		28%		22%		16%		8%	
Total %	100%		100%		100%		100%		100%	
Total Nos.	456		391		445		400		771,900	

The most striking difference is between the A and B classes. If we call most manual workers 'working class,' and the rest of the population 'middle class,' then we have a rough guide that is generally understood. In this sense then there are 37% middle class children in the A streams, and only 21% in the B streams. Moreover, within the middle class those children with professional fathers tend even more to be in the A stream (21%) than the B stream (6%). This tendency goes all the way down: there are *more* skilled workers' children in the A class (31%) than in the B class (24%), and fewer labourers' children (11% as compared with 28%).

The small unstreamed schools provide some contrast to this. Again the number of middle class children is less, especially in the very smallest schools. It may be that the middle class is very ready to use the large streamed schools where its children generally get into the A class, but more reluctant to use the smaller, and most especially, the village schools. Either they don't live in these areas, or they send their children elsewhere. The final column shows the distribution of occupied males in the districts in which the questionnaire was used. This almost coincides with the general social position reflected by the unstreamed schools, and further illuminates the social selection within the larger streamed establishments.

We might, then, say that were this evidence to be borne out, streaming (whatever its educational reason or functioning) reflects some form of social selection within local society.

The teachers were next asked to place their pupils in three age groups. The results are shown in Table II.

Table II

Date of Birth	A Stream	B Stream	Mixed ability classes in small schools	Mixed age classes in very small schools
September 1st to December 31st	38%	28%	33%	32%
January 1st to April 30th	36%	37%	34%	34%
May 1st to August 30th	26%	35%	33%	34%
Total	100%	100%	100%	100%

In the 29 classes from smaller, unstreamed schools the distribution by birthday is fairly even. But both the A and B classes break this pattern in opposing ways. In the A classes 38% of the children were born between September 1st and December 31st; in the B classes only 28%. There was little difference for children born between January 1st and April 30th, but the scales dipped against those born between May 1st and August 30th. In other words the oldest children in the year were tending to go into the A classes and the youngest into the B classes. Again, we might say that, were this evidence born out, then (whatever the academic reasons, judgements, or measures used) there was some tendency for streaming to become a mild form of *selection by age within a year group*.

It is interesting to speculate whether this is not directly connected with the times at which the children entered infant school. Since children usually enrol in the term in which they become 5 years old, this means that some children may spend six terms in the infant school whereas others spend only 4. Or to put it more dramatically, one child may have had 50% more schooling than another when, at the age of 7, he is assessed for an A, B or C class.

If so much does depend on the *original* judgement of a child's capabilities as A, B or C, then it would be useful to know how the streamed schools first assessed their children. Of the 21 streamed classes, 2 had already been streamed from the infant stage, 8 had been streamed at the age of seven, and 1 had waited until the age of eight. Table III sets out the methods used.

Table III

Streamed at 6 (*i*) Arrived streamed from infant school	2	Main weight falls on home background plus successful start in the infant school.
Streamed at 7 (*i*) Streamed according to infant school 'report'	6	
(*ii*) Streamed according to infant school 'report' plus an 'examination'	2	
(*iii*) Streamed according to school attainment test in English, Arithmetic and Reading	6	
(*iv*) Streamed according to school attainment tests in English, Arithmetic and Reading, plus a declared intelligence test	1	Some weight given to potential as opposed to attainment.
(*v*) Streamed according to declared external attainment tests in English, Arithmetic and Reading, plus a declared intelligence test	2	
(*vi*) Streamed by using a declared intelligence test only	1	
Streamed at 8 (*i*) Streamed according to first year teachers' recommendations	1	
Total	21	

Of the 21 classes, 10 placed a heavy reliance on the child's success and teacher's judgement in the infant school. 6 others streamed according to what the child had attained by the end of infant school and beginning of junior school, using methods and tests of their own. Only 4 schools made a measure of potential as opposed to achievement. Only 2 schools used a full set of recognised external tests on which to base their judgement. The overall tendency was for the school to stream children according to what home plus 4, 5 or 6 terms of infant school had given them, judged according to methods which were particular to that school rather than external and standardised.

If streaming in these 21 schools was somewhat affected by age and social background, if it took place so early and was determined so much by infant school success, then how did the teachers feel about it? Did they endorse it, or not? Table IV sets out the replies.

Table IV

Attitude to streaming	A Stream	B Stream	Mixed ability classes in small schools	Mixed age classes in very small schools	TOTALS
For Streaming	7	6	7	4	24
Qualified approval of Streaming	2	2	3	3	10
Against Streaming	2	2	6	6	16
				Total:	50

The largest group (24) were unequivocally in favour of streaming. But the number against was perhaps abnormally large (16), and there were 10 who defined some intermediate position (streaming only under certain conditions). One difference is between the teachers of streamed classes, and the rest. The majority of the former endorsed streaming (13 to 4), whereas in the small schools only a minority favoured streaming outright. It would be valuable to know whether this merely means that teachers taught in schools in whose organisation they believed, or whether it had to do with the direct experience of handling streamed or unstreamed children. For example, did the teachers in small schools draw their confidence in non-streaming directly out of their daily work with such classes? Had the streamed teachers ever tried (or seen) unstreamed teaching—or *vice versa*?

The 10 teachers who accepted streaming with some qualification are worth further examination for their indeterminate position revealed some of the many things that teachers weighed up as they made their decision, for or against. Many added the proviso " providing it is fluid streaming," but it is difficult to know how much more than a merely formal thought this was. Daniels has shown convincingly enough how a sample of teachers may imagine that there is very much more fluidity in a streaming system than in actual fact there is. The connections with the ' self-fulfilling prophecy ' that can be built into a streamed school are all too obvious.

Several accepted streaming until, in their opinion, the standards of primary school teaching were raised. If the quality of teaching improved then " good teacher—no streaming." They felt that we had not, at the present moment, enough teachers of sufficient calibre to manage unstreamed classes. Yet others felt that streaming was the only way to handle large classes, but that it might be abandoned when there was an improvement in the pupil-teacher ratio: " I endorse streaming under the present conditions of large classes. If classes were ever reduced to 30 then I would re-consider my decision." Others still felt it was only necessary in the years immediately preceding the 11 plus, and not at 7 or 6; and a few wondered if ' setting ' might help, but could find no way around ' time-table difficulties.'

It would seem then that different teachers may see streaming as serving very different ends; and it looks as if the streaming system is supported, in their view, by many interconnected pressures—the selection examination, the size of primary school classes, parental pressures, class rather than individual teaching, the quality of existing teachers, and even their hopes of promotion.

They were next asked, " What exactly is the purpose of streaming? " About half the teachers felt that there was a single *raison d'être* to streaming, but the rest suggested two or even three purposes. 22 teachers said quite simply that it was a device whereby children of similar ability were taught together: when they considered children in any one year they wrote as if they conceived of them as 2 or 3 separate ability groups, each clustering around its own mean, as in figure A. Two teachers disputed this picture, and added that the purpose of streaming was initially to " close the spread " at top and bottom so as to provide more homogeneous groups: they acted on the conceived spread of children's ability shown in figure B.

Figure A.

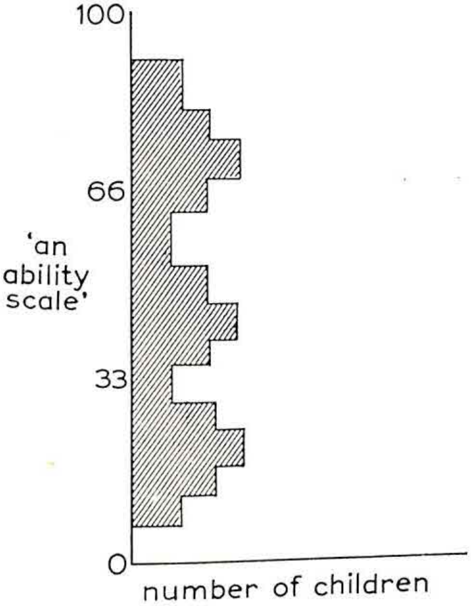
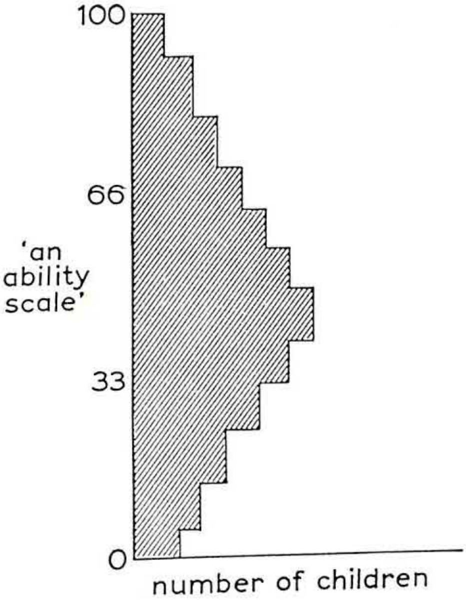


Figure B.



This is extremely tentative, but we might suggest that whereas the spread of children's ability is more likely to resemble figure B, the effect of streaming may be to change it to figure A. Many teachers however (especially in streamed schools) considered figure A to be the original fact and not merely the result.

16 teachers said that the function of streaming was to ensure that bright children were not held back, and so missed their 11 plus places. 8 of these teachers approved of streaming, and 8 objected to it. Those who saw streaming or non-streaming as a black and white choice agreed that it was paramountly a pre-selection device.

11 teachers, on the other hand, thought that streaming was not designed for the gifted child but rather to protect and help the backward. No A stream teacher thought this, and 9 out of these 11 replies came from schools in which no streaming took place. So teachers at a distance from streamed schools imagined it an egalitarian device, whereas those teaching streamed classes saw it as especially concerned with the preparation of grammar school children.

8 teachers said that streaming was essentially a device to make the teaching situation tolerable in large schools, and its first purpose was to make life easier for the teacher. These were mostly men and women who took up an intermediate position on the opposition of streaming and non-streaming. A further 6 teachers (of whom only one favoured streaming outright) said that streaming was a strategy to make the *head teacher's* life more tolerable—simplifying organisation, improving 'efficiency.'

There were, then, curious differences of opinion as to what streaming was for. Teachers engaged in handling streamed classes had fairly clear views, usually connected directly or implicitly with the 11 plus selection (" for the bright child to have the best teachers "). But the majority of teachers at a distance from streamed schools discussed it as one of the settled ' Institutions of England,' and accounted for its continuing existence (as they might with such other Institutions as the House of Lords or the Royal Family) in a variety of often opposing ways.

The teachers were next asked, " *What kind of people or groups in society support primary school streaming?* " 16 gave a directly social answer. 11 of these said that it was supported by professional class parents using state primary schools. 3 said support came from the " aspiring middle class," and one from " the lower middle class—particularly when there are poorer children in the neighbourhood at the same school." 14 answered in slightly different terms, saying " A stream parents " and sometimes transposing this with " intelligent parents "—which implied perhaps that streaming not only selected children, but selected parents and families.

18 called on professional experience—10 of these answering that whoever objected to streaming, " the majority of teachers " were for it. 6 others simply added that endorsement came from those " who had had experience," and the remaining 2 narrowed it down to " good A stream teachers."

13 claimed that streaming was supported by those who cared especially for grammar school education, and 2 of them singled out head teachers as caring very much in this way. These comments did not usually come from supporters of streaming.

Other answers given were " traditional " or " *laissez faire* " elements in society, teachers only interested in traditional classroom methods, the " uneducated in education," and " most of western civilisation which is based on discrimination and competition."

So whatever teachers took to be the purpose of streaming most of them felt that, as a fact, it often worked to select and support *existing* groups within society, and to support teachers whose status, future, and self-respect had some connections with successful eleven-plus results.

The teachers were next asked, " *What kinds of people or groups in society are sceptical of primary school streaming?* " 13 teachers answered immediately in terms of parents with children in low streams, but thereafter the answers broke up interestingly, and very much in contrast with the previous question.

12 teachers said streaming was doubted by those with left wing political views. 2 teachers refused to answer because, they said, the question " was a political one." This compares markedly with the previous block—to doubt streaming was felt to be a " political " activity, but to support it wasn't.

10 teachers felt the doubts came from people working in education who were not actually teaching. 7 said " educational psychologists," and the others seized on " educational philosophers," " educational reformers," " sociologists " and " educationists." These remarks were invariably hostile.

There was no other clear block of answers, except that 6 A stream teachers (and no one else) said that opposition only came from " inexperienced " teachers. Otherwise the replies scattered widely and many of these answers were in the form of sharp criticism.

The criticisms were extremely striking. All the previous questions had been answered very coolly, but this one drew sparks—especially from those who endorsed streaming. Prose heated up and it was stated that opposition to streaming came from:

> " those who *like to consider themselves* ' modern educationists' "
>
> " those with a chip on their shoulders "
>
> " free thinkers and nebulous characters "
>
> " people who wrongly believe that men are born equal "
>
> " socialists with inferiority complexes and/or dull children"

It was as if these teachers felt themselves to be on the defensive, holding a difficult position and able to deal with powerful opponents only after they had reduced them to caricature.

The teachers were finally asked, " *What would happen if streaming in schools was abandoned*? " 17 felt that there would be a " social gain "—this group included most of those who were opposed to streaming and, intriguingly enough, the majority of the A stream teachers. Only 1 teacher felt there would be a social loss.

Against this 13 teachers felt that general academic standards would be lowered, and a further 8 mentioned that it would be the " bright children " who would lose. 4 believed that the backward child would also lose. On the other side 8 teachers thought that the general standard would improve, and a further 5 that backward children especially would gain. No one claimed that non-streaming would improve the attainment of the most gifted children. All the A stream teachers, save one, confined themselves here as elsewhere to possible effects on A stream children, in a ' school within a school ' spirit. Other teachers discussed all children fairly equally.

4 replies suggested that life would now be harder for class teachers, but a further 5 claimed that the morale of B and C teachers would leap, for teachers also would be ' unstreamed.' Other responses included a marked increase in the demand for smaller classes, a new impetus to individual rather than class teaching (" the teacher would replace the instructor "), and a decrease in 11 plus pressure from parents.

The general position was that the largest group felt that unstreaming would result in a distinct " social gain." But this was not seen as the pre-requisite condition for the multiplication of ability, for most also felt that academic standards would be lowered. Teachers disagreed over which was the more important of these two emphases, and as one A stream teacher put it, non-streaming might give " a far more balanced society with perhaps some lowering of educational standards," *and so he was utterly against it.* Comments were always directed at the reaching of a certain academic standard at a certain age. The idea that children might eventually, under these conditions, reach or surpass a declared academic standard—but only after several more years at school or college—was treated as " lowering standards." That is to say, most teachers had built into their concept of ' standards ' an essential idea of *speed.* Fast growth was their ideal.

General

Some teachers added some general remarks of their own. Several wished to press the point that streaming was not just an educational device to be discussed in enclosed educational terms; it was an understandable impact on the schools of something basic to Western ideology. One pointed back to Aristotle: " Streaming takes place in all walks of life and the community. Read Aristotle! "; another to new Africa: " The emergence of new nations in Africa has demonstrated clearly the need for a minority of highly-trained professionals in any given country. To produce these I think some kind of separate and accelerated programme must be available in the primary school. *It is not clear that the remainder need streaming.*"

Altogether those who favoured streaming were much more consistent and detailed in their opinions. Their sharper organisation of ideas suggested that as a body they would be much more powerful in schools than the rest. They came from every kind of class and school, and held in common the belief that the function of the primary school teacher was to select and rapidly advance a gifted minority of pupils—for, even allowing for some social loss in the younger years, this was ultimately for the common good. Streaming for them was not just one schoolroom way amongst others, but in the end a response to basic values and drives in our society. They felt their position was under challenge, and at times maintained the temper of their argument only by protective caricature; but, for all that, they firmly held their ground with statements whose quality was that of the defiant trumpet-call.

This very small enquiry points to the possible effects of social class and age on primary school streaming, and reminds us of the layers of belief which underpin its practice. Yet it seems that teachers in schools where these effects are marked, are not distinctly aware of them, are unclear about what—besides ' children '—is actually being streamed. It would be an excellent thing if teachers in schools would more often analyse the children in the very simple ways of Tables I and II, and perhaps those who can, ought to encourage such activity. Whatever direction opinion or action takes, it cannot but be a good thing for teachers to know the facts about the classes they teach, and to be fully alive to the processes they encourage and serve.

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Research Note:

OVER 135 I.Q.

by JOHN NISBET and ALASTAIR GAMMIE

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WHERE Local Education Authorities have kept detailed records of the results of tests applied in selection for secondary education, there is a rich field of material for useful, short-term research studies. For example, Terman's classic study of gifted children in California could now be repeated, at least in its initial stages, in many areas of this country without undue expense or difficulty. Such follow-up studies would help to throw light on the question of how effectively our school system is providing for the highly gifted pupils and on some of the controversies associated with the proposed expansion of higher education.

The Aberdeen Survey

The records of the Transfer Examination (for transfer from primary to secondary school) in Aberdeen over the period 1950-53 were used to demonstrate the practicability of such a follow-up. This examination includes two group tests of intelligence or verbal reasoning each year. The scores in these tests are standardised within each age-group to give a mean of 100 and a standard deviation of 15 for Aberdeen pupils. We selected for our inquiry those pupils who scored an average of 130 or over on the revised quotients of these two intelligence tests. As the average score of Aberdeen pupils by national norms is usually about 104 or 105, the minimum level taken here is equivalent approximately to 135 I.Q. In the four years a total of 159 pupils obtained scores at this level or above. The total eleven-year-old age-group in each of these years was about 2,700.

It is possible that errors of measurement resulted in the inclusion in our group of some whose talents were not as outstanding as their scores suggested. However our use of an average score from two tests reduced the likelihood of such error.

The matriculation records at Aberdeen University for the period 1956-61 showed that 78 of these pupils had entered university. Only a very small proportion of students from Aberdeen schools go to other universities (except for post-graduate study). Thus, we can state with some confidence that only about fifty per cent. of these very able persons have gone to university—and this in a country and a city where the tradition of a university education for all who are able to qualify for it, is well established. In Terman's Californian group of approximately thirty years earlier, the proportion who went to college was nearer ninety per cent. What has happened to the fifty per cent. in Aberdeen who did not go on to university?

The 1953 Group

To answer this question, a single year-group was followed up individually. In the 1953 Transfer Examination, 36 pupils scored an average of 130 or above in the two intelligence tests. Of these, 20 are now at Aberdeen University. Two of the remainder are still at school (one having been retarded by a serious illness), but neither seems likely to reach university entrance standard. Two others left school without sitting the Scottish Leaving Certificate, one to become a nurse and one to enter the Services. Eight sat the Leaving Certificate but failed to get university entrance; two of these are working in insurance, two in journalism, and the other four are continuing further education, in technical college, art college, commercial college and teacher training college. Four others did sufficiently well in the Leaving Certificate to enter university if they wished, but decided otherwise: one holds a commission in the Services; one is in the Executive Branch of the Civil Service; one is an apprentice chartered accountant; and one a nurse.

This review of the occupations entered by those not at university shows that it would be quite wrong to classify this group as ' wastage.' The follow-up would have to be extended over many years before we could judge whether the initial promise had been fulfilled. The one who left school without a Leaving Certificate to join the Services, for example, was recommended for a commission within three months of enlistment. Others may yet distinguish themselves in other ways. A university education is not necessarily the best choice for all persons in this range of ability.

Fathers' Occupations

However, if we look at the fathers' occupations in this group, we find a trend which resembles that reported in the Ministry of Education (1954) study of *Early Leaving*. The proportion attending university is much greater among those whose fathers are engaged in professional and non-manual occupations than among those from homes where the father is in a manual trade or is an unskilled labourer (Table I).

Table I. 1953 Group: Fathers' Occupations

	Father's occupation:			
	Non-manual	Manual	Not known	Total
At university	15	3	2	20
Not at university	4	10	2	16

The disproportion in the 1953 group would seem to be particularly marked. For the other years, only the fathers' occupations among those attending university were traced: Table II shows the distributions in these years.

Table II. 1950-53 Groups: Fathers' Occupations

Year	Those at university: fathers' occupations— Non-manual	Manual	Not known	Total	Not at university
1950	12	5	3	20	22
1951	9	7	2	18	22
1952	11	7	2	20	21
1953	15	3	2	20	16

Conclusion

The purpose of this report is to demonstrate that a survey of gifted pupils can now be made from readily available records. The present survey showed that only half of the pupils who scored 135 I.Q. or over at age eleven proceeded to university. The area in which this survey was carried out was particularly well suited to such a follow-up, since virtually all the university students could be traced from the records of a single university. But much of the information was got directly by post or by phone, or through the secondary schools. In other areas, the records of local authority awards could also be consulted to trace the educational careers of pupils. It proved easy to gain the co-operation of the subjects in an inquiry on this topic: our description of the investigation as a follow-up of pupils whose primary school careers had been outstanding, seemed to dispel suspicion at once and established a favourable attitude in all those we approached.

Research Note:

TEACHERS AND THE SOCIO-ECONOMIC FACTOR

The Socio-Economic Factor as an Unstable Factor Liable to the Influence of Social Change

by E. J. GOODACRE

A recent study by Morris for the National Foundation on the teaching of reading found that of a number of variables the one most significantly related to Reading Attainment was socio-economic. This is not a novel finding, since other studies have stressed the importance of this factor. But what has always been interesting in such studies is the number of different methods that have been used in the last few decades to try to assess this elusive variable. Their variety tends to emphasise the complexity of the variable whose very name implies the wedding of two perhaps disparate aspects. Each of the two is likely to reflect social change, and the changing nature of the measures used may itself be due to a genuine change in what is to be measured.

Fleming, writing on this subject in 1943, pointed out that Socio-Economic Status has been assessed in a variety of ways: by relying on the opinion of representative townsmen or of the headmaster and attendance officer of the school; by the use of questionnaires; by gathering information as to taxes, possession of a telephone, the rent or size of the house, or the occupation of the family; by weighting reports based on material possessions and the appearance of the home; and by taking the school itself as a measure of social grading—a procedure justified by the observed fact that considerable homogeneity of social type is a characteristic of most schools.

In her own study, Fleming assessed the economic aspect and defined it in terms of material prosperity. She did however suggest that further investigations should consider evidence as to the more intrinsic characteristics of the homes and compare these with the results from measures more strictly socio-economic in nature. A little later, Burt (1947) commented that the Social Surveys in this country " have hitherto been limited chiefly to economic conditions and the material standards of life. The social attitudes, ideals and behaviour of different groups are barely touched upon."

Inquiries such as that into early leaving showed there were still differences between pupils at the secondary school level related to home conditions, and that it was possible that the provisions of the Welfare State, whilst obviating some of the strictly economic discrepancies between social groups, only revealed more subtle social differences. Floud, Halsey and Martin pointed out that whereas in the past, the problem of social waste in education could be seen in comparatively simple terms, the influence on the distribution of educational opportunity of the material environment at home and at school before the age of selection is tending to diminish. Because of social reforms and general prosperity, social factors influencing educational selection reveal themselves in more subtle forms today.

The most recently published contribution to this problem is that by Fraser. She studied school progress using an assessment of environmental conditions in economic, motivational and emotional terms. Her findings show clearly that such factors are more closely correlated with school progress than with intelligence, and that the difference between these correlations is highly significant. One of these environmental factors was that of parental encouragement which correlated +·66 with school progress. It is interesting that the rating of parental encouragement used was that made by the teachers; and Fraser makes the point that little is known about the basis on which such assessments are made. She suggests that in many cases it is unlikely that the teacher knows the parents and is consequently unable to assess their attitudes directly, and that in the majority of cases the teacher must be forced to make an assessment from indirect clues such as the help the child receives with homework from his parents.

Teachers' Consciousness of the Socio-Economic Factor

Undoubtedly teachers are likely to be aware of some at least of the socio-economic factors, but there is indeed little evidence available as to how and on what ' indirect clues ' their awareness is based or the effect of it on their teaching. The terms ' good ' and ' poor ' home background are commonly used in staff rooms, and sometimes they imply differences of expectation as to individual children's attainment and potential abilities—" Poor little thing, you can't expect much, she comes from such a poor home," or " you know, he should be able to do better, there is a good home there."

It is not clear in what sense such remarks are being made: whether they are purely descriptive of the material standards; or are meant to imply less concrete evaluations such as the degree of motivation and the general emotional climate of the home. We do not in fact know whether the reference is to the ' economic ' or the ' social ' or to some blanket two-dimensional factor. It is interesting that the evaluative term ' good ' is used rather than ' rich ', ' well off ' or ' prosperous ' which are applicable only to the material concept. ' Poor ' on the other hand can be used either in the strictly economic sense of ' having little money or means,' or of ' deserving of pity, unfortunate ' in the qualitative sense.

Recently in the course of a reading research project being carried out by the National Foundation in a large educational authority, the opportunity arose to find out more about what the terms ' good ' and ' poor ' mean to teachers when applied to their pupils' background. By means of a questionnaire, 206 reception class and head teachers were asked to say what in their opinions were the characteristics of a ' good '/' poor ' home background. Additional questions were asked to try to elucidate the basis of teachers' assessments of environmental conditions, that is to find out more about those ' indirect clues ' which must be the basis of such judgements and which Fraser suggested as worthy of future research.

There was little difference between the mean number of items mentioned for either category, an average of 2·23 characteristics for ' good,' and 2·95 (slightly more) for ' poor.' Perhaps it is easier to say what is wrong with a thing, than what is right with it. Head teachers tended to give slightly more items than class teachers, which may reflect their more frequent contacts with parents and rather longer experience.

Table I

‘Good’/‘Poor’ Characteristics

(206 teachers in 100 primary schools)

Rank Order		Characteristics	Description	Good		Poor	
Good	Poor			Total No. Chars.	% of Total No. given	Total No. Chars.	% of Total No. given
1	2	Motivational	Parents interested/not interested in child’s activities, spend time with child, answer his questions, mental provision/lack of, etc.	151	26·87	125	20·53
2	1	Emotional Climate	Stable/unstable home life, child loved/not wanted, broken home, family unity/lack of, mutual family consideration/bickering	131	23·31	128	21·02
3	5	Cultural Factors	Good conversation/swearing, poor speech, visits to interesting places/too much street play, right amusements/pools, dogs, etc., books/lack of	97	17·26	66	10·84
4	6	Material Provision	Good/poor food, clothing, plenty of/insufficient sleep, physical care/lack of, neglect	44	7·83	56	9·20
5	3	Moral Training	Firm but kindly discipline/laxity, little discipline, ‘children run the streets,’ spiritual, religious faith/lack of, independent/indulged	37	6·58	78	12·81
6	8	Regularity, organisation, training	Regular/irregular meals, sleep, habits; cleanliness/dirtiness; planned/unplanned television watching ..	32	5·94	35	5·75
7	4	Economic Factors	Housing/overcrowding, mother at home or makes provision/both parents working, financial security/insecurity, hire purchase	31	5·52	73	11·99
8	7	Interest in Child’s School Progress	Parental help with school work/lack of, interested/not interested in education	30	5·34	36	5·91
9	9	Unclassifiable	Quiet/noise, tidy/untidy, over-anxiety, settled schooling	9	1·60	12	1·97
				562	100	609	100

As can be seen from the first of the two tables, the most often mentioned characteristics in the ' good ' category were motivational and emotional. Although there were a number of church schools represented in the sample, the concept was rarely defined in evaluative or spiritual terms. Of course, this may well be one of those instances of the respondent so taking an aspect for granted, that he or she omitted to mention it when confronted by an open ended question. When it came to describing the ' poor ' home, however, moral training and spiritual values were more to the fore, mainly in the sense that the ' poor ' home was that in which material standards were dominant to the detriment of spiritual development.

Difference According to Social Area

It was possible to divide the schools into three groups based on the differences of social class distribution for the areas in which the schools were situated. This information was obtained from the *Report on Greater London and Five Other Conurbations* (1956) based on the 1951 Census figures for England and Wales. Area A is that in which there is a greater proportion of professional occupations, whilst C is that in which the semi-skilled and unskilled occupations predominate. The second table shows the emphasis placed on the different aspects according to the social background of the school in which the respondent taught.

Table II

Percentage by category of Different ' Good '/ 'Poor ' Characteristics in each Social Area

(206 teachers in 100 primary schools).

Characteristics	Good			Poor		
	Area A	Area B	Area C	Area A	Area B	Area C
Motivational	25·99	25·77	28·38	21·16	19·64	20·63
Emotional Climate	25·99	23·93	20·72	24·34	23·21	17·06
Cultural Factors	14·7	20·25	17·12	8·47	10·71	12·70
Material Provision	8·47	6·75	8·11	5·29	8·93	12·30
Moral Training	7·34	6·75	5·86	16·40	10·12	11·90
Regularity, organisation, training	8·47	6·75	2·70	7·94	4·17	5·16
Economic Factors	2·82	5·52	7·66	9·52	13·69	12·70
Interested in Child's School Progress	5·08	4·29	6·31	5·29	7·14	5·56
Unclassifiable	1·13	0·00	3·15	1·59	2·38	1·99
	100	100	100	100	100	100

The mean numbers of items for each were similar, but some items were more often mentioned from some areas than others. For instance, in describing the ' good ' home background, the ' higher ' the social area, the more often items concerned with regularity were mentioned, or as might be expected, the ' lower ' the social area, the more frequent were the economic items. Some of the differences may represent differences in the various teachers' familiarity with or knowledge of the area in which they taught. For example, the more frequent occurence of the emotional aspect in the ' higher ' social area could be interpreted as a greater awareness by the teachers of the problem of family unity in the particular area. In the ' lower ' areas, where divorce is perhaps less common than separation and alterations of family groupings, the ' broken ' home may make less impact on the child, and hence on the teachers' awareness.

What is evident from this breakdown by social areas, is that teachers in different areas are probably using the idea of ' good ' and ' poor ' home with different criteria in mind. The teacher in the C area may be thinking of background in economic terms whereas the teacher in the A area may be concerned less with those obvious material differences, and more with those ' subtle forms ' referred to by Floud, Halsey and Martin.

More characteristics of a motivational nature were reported in the C area, in regard to the ' good ' home background, and one is tempted to wonder whether the teachers in these areas are perhaps expecting co-operation with the school and an interest and ability to further school aims and methods, which may be difficult or impossible to achieve in such areas. For instance, in the specific matter of teaching reading, parents in such areas, experiencing overcrowding and a lower standard of living may be able neither to buy the books of the school reading series nor to help with ' hearing ' reading, which teachers reported as being the evidence of a ' good ' background.

Teachers' Attitudes to Home Background

Very little seems to be known about either the extent or the effect of teachers attitudes to their pupils' home background. It may well be that teachers differ greatly in their attitude, that some are concerned with this factor and as a consequence try to adapt their methods or to supply deficiencies. For example, the teacher who believes that children from ' poor ' homes (in the motivational or economic sense) need a period of browsing, of becoming familiar with books, of story periods intended to fire an interest and desire to learn to read, may delay formal instruction for the initial year of the infant course, whilst other teachers who consider children are there in the classroom to be taught, set out upon a teaching programme unrelated to considerations of background and expect children to learn to read from the very beginning of infant schooling.

There may be a definite relationship between teachers' attitudes to home background and their attitudes to what is termed ' reading readiness.' Until there are effective measures of teachers' attitudes to home background, there is no definite evidence as to the manner in which such attitudes can affect teachers' estimates of their children's abilities; e.g. the possibility of over- or under-estimation of abilities in relation to home background.

Conclusion

This very brief study does to some extent demonstrate that teachers' opinions reflect the results of measures of social reform operating in the community. Teachers in general probably have in mind differences in the emotional and motivational aspects of home background when they talk of a ' good ' or ' poor ' home. The bare-foot children of the thirties have been replaced by those who are emotionally deprived and/or whose parents are uninterested. Teachers' opinions reflect the changing emphasis within and the general impact of the socio-economic factor, and as Burt (1947) wrote thirteen years ago " the very speed with which social characteristics, influences and conventions are changing means that psychologists who are engaged on research in the educational field must continually undertake intensive investigations on the sociological aspects of their problems." While we know so little about the extent and the effect of teachers' attitudes in regard to the socio-economic influences on children, the association between good attainment and socio-economic status should be interpreted with some caution.

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Research Note:

THE LONG-TERM EFFECTS OF REMEDIAL TREATMENT

A Follow-up Enquiry based on a Case-study Approach[1]

by M. L. Kellmer Pringle

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THIS study is part of a larger investigation into the short-term and long-term effects of remedial education. It is based on the clinical work done by the Department of Child Study between the years 1948 and 1958. A letter was sent to 240 parents explaining that it was proposed to carry out a follow-up study of children who had received remedial treatment but that lack of staff prevented a personal interview; for this reason a written enquiry was being made about the child's progress since being discharged. The parents were told that we should like to obtain also a report from their child's present headmaster. The final response rate to the questionnaire[2] was 78%; in 14% of cases the family had moved and it proved impossible to obtain their new address; the remainder must be interpreted as a refusal to co-operate (8%). On the other hand, more co-operation than had been asked for was shown by over 10% of the parents; twenty of them sent letters in addition to completing the questionnaires and five telephoned to elaborate their answers to some of the questions.

To begin with, it was decided to analyse the questionnaires of those children who were still at school and who were discharged not earlier than the summer of 1952. There were 80 cases, 64 boys and 16 girls.

The main criteria governing the design of the questionnaire were brevity and simplicity: brief, factual questions minimise the difficulties of the less literate parents; moreover, most people dislike filling in questionnaires and thus the shorter and less complicated it looks, the more likely is it that it will be completed. Despite these precautions, our questionnaire (like most others) remains a coarse instrument and a second-best to follow-up interviews by a skilled Psychiatric Social Worker.

So far the questionnaires completed by the 80 parents and 66 head teachers have been analysed. The great majority of children were adolescents at the time of the follow-up enquiry and were attending secondary schools of various types.

Three of the questions put to the parents were of a very general nature: the first enquired whether the child was at the present time making better progress than he had done previously, or whether he was doing only as well as before or even worse; the second question aimed at assessing to what extent the parents felt (in retrospect) that the treatment given had helped the child; the third and most general question aimed at obtaining the parents' view regarding the child's present overall progress and adjustment, since they were asked whether he was causing them a great, some or no worry.

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[1] A full account of this study will be published in *Vita Humana*, Vol. V, No. 1, 1962

[2] The questionnaire was drawn up and the method of analysing it was evolved by the writer in consultation with the Department's staff.

The great majority of parents consider that their child is making better educational progress since he received remedial treatment (Table I).

Table I

PRESENT SCHOLASTIC PROGRESS

N = 80

	Better than before	*As well as before*	*Worse than before*	*No reply*
N	63	10	4	3
% *(rounded figures)*	79	13	5	4

In about half the cases this treatment is thought to have helped a great deal while a small number felt it had not been of any help (Table II).

Table II

EXTENT TO WHICH TREATMENT HAS HELPED

N = 80

	A great deal	*To some extent*	*Not at all*
N	41	35	4
% *(rounded figures)*	51	44	5

Lastly the great majority of parents stated that their child gave them no cause for worry at the time of the enquiry (Table III).

Table III

PARENTS' PRESENT CONCERN REGARDING CHILD

N = 80

	No cause for worry	*Some cause for worry*	*A great deal of worry*
N	65	11	4
% *(rounded figures)*	81	14	5

Some more detailed questions were asked to elicit information on the educational progress each child was making at the time of the enquiry. Three descriptive categories were obtained. One third of the children are thought to be making excellent progress at school while about a quarter are still experiencing difficulties with one of the key subjects (Table IV).

Table IV

PRESENT EDUCATIONAL PROGRESS

N = 80

	Excellent	*Quite Satisfactory*	*Poor*
N	27	32	21
% *(rounded figures)*	34	40	26

Questions were also asked about present social and emotional development in view of the emphasis on this aspect of a child's growth during remedial treatment in our Department. In the great majority of cases, the parents consider their children's social and emotional development to be excellent or satisfactory. Very few fall into the lowest category of 'poor progress' (Table V).

Table V

PRESENT SOCIAL AND EMOTIONAL DEVELOPMENT

N = 80

	Excellent	*Satisfactory*	*Limited*	*Poor*
N	47	22	8	3
% (*rounded figures*)	59	28	10	4

Lastly, parental assessments of the child's present educational progress were tabulated in relation to their views of his present social and emotional development (Table VI).

Table VI

PRESENT EDUCATIONAL PROGRESS IN RELATION TO PRESENT SOCIAL AND EMOTIONAL DEVELOPMENT

N = 80

	Social and emotional development				
Educational progress	*Excellent*	*Satisfactory*	*Limited*	*Poor*	*Total*
Excellent . .	19	7	1	—	27
Satisfactory	19	10	3	—	32
Poor . .	9	5	4	3	21
Total . .	47	22	8	3	80

Development in both aspects is excellent in nearly a quarter of all cases, and poor in about 4%. If the excellent and satisfactory categories are taken together, 55 children fall within them for both educational progress and social and emotional development. Even of the children making poor educational progress, two-thirds show excellent or satisfactory social and emotional development.

There seems little doubt that the great majority of parents considered that remedial treatment had been of some help to their child. This view was held by most, even after more than six years had elapsed since regular attendance was terminated. The fact that most of the children did not give their parents any cause for concern is all the more satisfactory in view of the fact that most were adolescents at the time of the follow-up.

Our findings suggest that while children whose educational progress is poor may well be adjusted emotionally and socially, it is less likely that poor emotional and social development is accompanied by excellent educational progress.

Of course a study of this kind has many shortcomings. Since the children were discharged, a considerable period of time had elapsed, ranging from a minimum of eighteen months to six years. Obviously, all kinds of circumstances, both favourable and unfavourable, will have occurred in the children's lives; some of these may have helped their educational and social adjustment; others may well have undone any good that resulted from treatment in our department. We had no means of weighing up these circumstances. Another difficulty lies in the fact that we accepted the parents' judgements on their children's present progress and development, and relied on parental memory regarding the effect obtained by the treatment the children had received. On the other hand, the great majority of parents had been very concerned about their children's educational failure at the time when they were referred. One could expect therefore, that they would be able to compare the situation before and after remedial treatment had been given.

Lastly, there are as yet no reliable tools available to evaluate changes of attitude and personality, such as improvement in social relationships, in self-confidence, in perseverance and in motivation. For the time being we may well have to accept as valid criteria reports of improved behaviour or adjustment made by parents or teachers.

AN ANNOTATED BIBLIOGRAPHY OF BRITISH RESEARCH ON TEACHING AND TEACHING ABILITY

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SEVERAL bibliographies exist dealing with American research on teaching, but the results are not always directly applicable in this country, and it was thought that a corresponding bibliography of British work would be useful to researchers here as well as being of interest to those engaged in teaching and the training of teachers. It is not claimed that this list is exhaustive, but it is hoped that it is representative of the work which has been carried out. The accounts are arranged in two lists, one of articles in journals and the other of unpublished higher degree theses in university libraries. The order in both lists is chronological, as it was thought that this would help to show trends of research and bring out variations in the emphasis on topics over a period of years.

1. ARTICLES PUBLISHED IN JOURNALS.

Austin, F. M. (1931). **An analysis of the motives of adolescents for the choice of the teaching profession.**
British Journal of Educational Psychology, Vol. I, 87-103.

In an enquiry into the vocational choices of secondary school children teaching was the most popular profession, being chosen by 10 per cent. of the boys and 42 per cent. of the girls. Only a minority gave sound reasons for the choice or showed that they had any exact knowledge of careers or realised that they should choose one in which they had a good chance of success or happiness. The direct influence of relatives or teachers was the most frequent reason given for choosing teaching and there were many illustrations of a reluctance to grow up.

Cattell, R. B. (1931). **The assessment of teaching ability.**
British Journal of Educational Psychology, Vol. I, 48-72.

As a result of an enquiry among administrators, training college and university lecturers, teachers, students and pupils, a list of twenty-two qualities considered important in teachers was prepared. The relative importance of these qualities in young and mature teachers and men and women teachers was determined, and a rating scale for assessing student teachers was put forward. An abbreviated scale for use in the selection of candidates for training as teachers was also suggested.

PHILLIPS, M. (1931). **Professional courses in the training of teachers.**

British Journal of Educational Psychology, Vol. I, 225-245.

A questionnaire on the value of their courses of professional training was answered by 90 teachers who had been trained in various University Training Departments and two-year colleges. Many students, mainly women, considered that psychology was the most valuable part of the course, both personally and professionally. Teaching methods were regarded as of great importance by the men, most of whom were specialists. There was no overwhelming support for the view that the practical part of the course was more important than the theoretical or that training could be better conducted by schools than colleges. Teaching experience was not considered as a satisfactory alternative to training.

PHILLIPS, M. (1932). **Some problems of adjustment in the early years of a teacher's life.**

British Journal of Educational Psychology, Vol. II, 237-256.

Breakdowns among young teachers are usually the result of several factors rather than one single factor. They may be caused by personality difficulties, social or economic problems, or professional difficulties such as unsatisfactory placing of young teachers, bad working conditions, disciplinary difficulties, and unsatisfactory staff relationships. Of these, professional difficulties are possibly the most serious.

PINSENT, A. (1933). **Pre-college teaching experience and other factors in the teaching success of university students.**

British Journal of Educational Psychology, Vol. III, 109-126.

Among students in the University Training Department at Aberystwyth it was found that men, but not women, students with pre-college teaching experience tended to achieve higher Practical Teaching grades than those without such experience. Pre-college experience appeared to have an adverse effect upon the academic record of the women students but not on that of the men. Success in examinations in the Theory of Education did not seem to be connected with teaching experience either in the case of men or women.

VALENTINE, C. W. (1934). **An enquiry as to reasons for the choice of the teaching profession by university students.**

British Journal of Educational Psychology, Vol. IV, 237-259.

Among men students in four University Training Departments economic motives carried most weight in the choice of a teaching career. General liking for teaching and fondness for children were stronger motives among the women. Interest in favourite studies was a strong motive with both sexes. The influence of parents and teachers was not great. A minority of the students chose teaching as a stop-gap or because they saw no alternative. Objections to teaching included poor salaries, long training, small prospects of promotion, fear of getting into a rut, domination by examinations, and mental strain.

TURNBULL, G. H. (1934). **The influence of previous teaching experience on results obtained by students in a University Department of Education.**

British Journal of Educational Psychology, Vol. IV, 1-10.

This enquiry in the Sheffield University Training Department produced evidence that students with previous teaching experience did a little better in practical teaching but definitely worse in degree work than those who had no such experience. The performance of the two groups in educational theory was much the same. These results are compared with those obtained by Pinsent (1933).

DALDY, D. M. (1937). **A study of adaptability in a group of teachers.**

British Journal of Educational Psychology, Vol. VII, 1-22.

The success as teachers of a group of thirty-one domestic science students was studied in relation to their powers of adaptation. Adaptation was defined as involving the power to adjust to a situation without undue emotional conflict or display of emotion and without inducing conflict in the environment. Approximately half the group were classified as having difficulty in adaptation and this reacted unfavourably on their performance in teaching. Emotional relief obtained by discussing their difficulties resulted in an improvement in teaching.

LAWTON, J. A. (1939). **A study of factors useful in choosing candidates for the teaching profession.**

British Journal of Educational Psychology, Vol. IX, 131-144.

Academic ability, school records and interview impressions of training college students were correlated with their final teaching marks. All the coefficients obtained were significant. A composite estimate of teaching ability, based on academic attainment, interest in non-academic pursuits, and estimates of character qualities, was found to give a correlation with teaching marks sufficiently high to suggest that it would be a satisfactory instrument for the selection of students for admission to training colleges.

SAER, H. (1941). **A further investigation of pre-college teaching experience and other factors in the teaching success of university students.**

British Journal of Educational Psychology, Vol. XI, 183-196.

This study was carried out with a view to checking the results of the earlier enquiries by Pinsent (1933) and Turnbull (1934). On the whole the results obtained by the 1930-38 students at Aberystwyth corroborated Pinsent's findings. The effect of pre-college teaching experience on subsequent achievement appeared to be more clearly related to the type of experience and the stage at which it was gained than to its length.

WOOD, H. P. (1941). **The relative performance of Arts and Science graduates in a Teachers' Diploma examination.**

British Journal of Educational Psychology, Vol. XI, 8-19.

The performance in a postgraduate Teachers' Diploma examination of 304 Arts students was compared with that of 190 Science students. The performance of the Arts graduates was found to be significantly better than that of the Science graduates in all parts of the written examination, and better, but not significantly so, in practical teaching. Possible reasons for this are discussed.

TUDHOPE, W. B. (1942 and 1943). **A study of the training college final teaching mark as a criterion of future success in the teaching profession.**

British Journal of Educational Psychology, Vols. XII, 167-171 and XIII, 16-23.

In a group of 96 men and women teachers a high correlation (+0·81) was found between their college final teaching mark and an assessment made at least three years later by an H.M.I. Discrepancies appeared to be due to teachers teaching in schools or departments of different types from those for which they had been trained, to very abnormal conditions, to the attitude of the head teacher and the atmosphere of the school, to opportunities for specialising, and to emotional strain. These conditions in some cases raised and in others lowered the estimate.

TUDHOPE, W. B. (1944A). **Motives for the choice of the teaching profession by training college students.**

British Journal of Educational Psychology, Vol. XIV, 129-141.

Among 643 men and women training college students the most influential motives were a secure job, fondness for children, interest in a special subject, a desire to continue their own education, fondness for teaching, the possibility of doing good, and a good salary. Desirable motives outweighed undesirable ones. The decision to take up teaching was made earlier by women than by men, but only 7 per cent. of the whole group decided later than their first year in the sixth form.

TUDHOPE, W. B. (1944B). **Attitudes of secondary school authorities towards the training college course encountered by intending students.**

British Journal of Educational Psychology, Vol. XIV, 7-18.

In a survey of 643 men and women students in a mixed training college, 51 per cent. of the men and 71 per cent. of the women reported a generally encouraging attitude towards the college course from the heads of their secondary schools. Eleven per cent. of the men and 5 per cent. of the women reported a discouraging attitude and the remainder a non-committal one. Over 50 per cent. had been advised to go to a university instead. It is suggested that the attitude of secondary school authorities towards the training college course is unsatisfactory.

GRANT, P. J. T. (1950). **The social and educational background of emergency trained teachers and reasons for their choice of the profession.**

British Journal of Educational Psychology, Vol. XX, 164-173.

Information is given concerning the educational background, desire to teach, former employment, further education, decision to teach, pre-college training, hobbies and interests, and personalities of men and women in their late twenties and early thirties who were trained after the last war in four emergency training colleges.

EVANS, K. M. (1951). **A critical survey of methods of assessing teaching ability.**

British Journal of Educational Psychology, Vol XXI, 89-95.

An assessment of the value of pupil change, the judgement of experts, rating scales and pupil ratings as methods of evaluating teaching, together with evidence of the extent of agreement between these measures.

EVANS, K. M. (1952). **A study of attitude towards teaching as a career.**

British Journal of Educational Psychology, Vol. XXII, 63-69.

An outline of the results reported in the thesis by Evans (1946).

EVANS, K. M. (1953). **A further study of attitude towards teaching as a career.**

British Journal of Educational Psychology, Vol. XXIII, 58-63.

A test of attitude towards teaching as a career was administered to students in four training colleges and a University Training Department. The attitudes of the training college students were significantly more favourable than those of the university students, but in no case was there any significant correlation between attitude scores and Practical Teaching marks. In three of the colleges significant negative correlations were found between attitude scores and intelligence test results, and it is suggested that the reason for this result may be found in the social and economic conditions of the area from which most of their students were drawn.

SUTHERLAND, J. (1955). **A survey of students admitted to train as teachers in Scotland under the post-war emergency scheme.**

British Journal of Educational Psychology, Vol. XXV, 79-91.

All students in training for teaching in Scotland in the spring of 1949 sat an intelligence test and filled in a questionnaire. A number of these students had been admitted under the emergency scheme, and their results in their courses of study and the tests were later compared with those of the normal entrants. Little difference was found between the two groups.

OLIVER, J. N. (1956). **An analysis of the various factors associated with the assessment of teaching ability in physical education.** *British Journal of Educational Psychology*, Vol. XXVI, 66-77.

A rating scale for qualities important in teaching physical education was drawn up after consultation with men and women tutors and students, and was used in the assessment of the teaching of 127 men and 100 women students. Analysis of the results showed that three factors appeared to be important. These were a general teaching factor, a factor closely associated with personal and emotional qualities, and a factor associated with subject matter. There appeared to be general agreement throughout the profession as to the qualities and abilities necessary for successful teaching of physical education and there were no marked sex differences.

EVANS, K. M. (1957). **Is the concept of 'Interest' of significance to success in a teacher training course?** *Educational Review*, Vol. IX, 205-211.

A group of 41 women students in a University Training Department answered questionnaires about their general interests and their interest in various aspects of the work of a teacher. Comparison of their replies with their final examination marks in Practical Teaching and Theory of Education produced no evidence that students with many and varied interests were more successful in their course of training than those with fewer and less active interests. Neither was there any evidence that students who were keenly interested in the work of a teacher did better than those who were less interested. Significant negative correlations were obtained between interest in teaching and intelligence test results.

ROBERTSON, J. D. C. (1957). **An analysis of the views of supervisors on the attributes of successful graduate student teachers.** *British Journal of Educational Psychology*, Vol. XXVII, 115-126.

A brief account of the work reported in the thesis by Robertson (1953).

EVANS, K. M. (1958). **An examination of the Minnesota Teacher Attitude Inventory.** *British Journal of Educational Psychology*, Vol. XXVIII, 253-257.

At the beginning of their course, 109 students in a University Training Department were given the Moray House Adult Intelligence Test, Raven's Progressive Matrices (1937), the Minnesota Teacher Attitude Inventory, and a test of attitude towards teaching as a career. None of the test results gave significant correlations with Practical Teaching marks awarded at the end of the course, but all except the last gave correlations significant at the 5 per cent. level with marks in Theory of Education. The results of the M.T.A.I. did not correspond with either the American or Canadian norms, and a subsidiary experiment suggested that scores on the Inventory can be raised considerably by faking opinions where subjects wish to do this. Scores on the Inventory were significantly correlated with Progressive Matrices scores but not with Moray House Test results.

BURROUGHS, G. E. R. (1958). **A study of the interview in the selection of students for teacher training.**

British Journal of Educational Psychology, Vol. XXVIII, 37-46.

Students applying for admission to a university training department were interviewed and ratings made under a number of headings by the interviewers. Factor analysis of the ratings resulted in the identification of three factors concerned with the observable features of the applicant, his intellectual maturity and powers of self-expression, and personality traits thought to be important in teaching. The first two factors gave the best prediction of teaching ability. It is suggested that, within its own limitations, the interview is as good a predictor of success as most other measures.

COLLINS, M. (1959). **A follow-up study of some former graduate student teachers.**

British Journal of Educational Psychology, Vol. XXIX, 187-197.

The assessments made during training of 115 graduate student teachers were compared with assessments made one to seven years later by heads of schools in which they subsequently taught. It was found that 75 per cent. of the students achieved what would have been expected and a biserial correlation of +0·566 was obtained between heads' and tutors' assessments. Discrepancies between assessments seemed to show the influence of type of school, academic achievement, physical and mental health, family problems and length of professional experience on success in teaching.

CHARLTON, K., STEWART, W. A. C., and PAFFARD, M. K. (1958).
Students' attitudes to courses in Departments of Education in universities.

British Journal of Educational Psychology, Vol. XXVIII, 243-252.

This is an interim report of a long-term study of the attitudes of students to their courses in University Departments of Education. It presents an analysis and comparison of the attitudes, as measured by a scale combining the Thurstone and Likert methods of construction, of students in the University of London and the University College of North Staffordshire.

CHARLTON, K., STEWART, W. A. C., and PAFFARD, M. K. (1960).
Students' attitudes to courses in Education.

British Journal of Educational Studies, Vol. VIII, 148-164.

This is a later report of the 1958 study by the same authors (see above). On the whole the students expressed qualified approval of their Education courses and no evidence was found to support the sweeping negative criticisms sometimes voiced of the work of University Departments of Education.

II. UNPUBLISHED HIGHER DEGREE THESES.

PANTON, J. H. (1934). **The Assessment of Teaching Ability with Special Reference to Men Students in Training.**

Unpublished M.A. Thesis, University of London Library.

This investigation was aimed at discovering a method of standardising assessments of Practical Teaching and making them more reliable. Standards were found to vary from one college to another and distributions of teaching marks diverged from normal. Forty-nine men students were rated on a large number of qualities and the ratings were correlated with their teaching marks. The distribution of teaching marks was adjusted by using a rating scale based on the results.

HOLLIS, A. W. (1935). **The Personal Relationship in Teaching.**

Unpublished M.A. Thesis, University of Birmingham Library.

Over eight thousand school children between the ages of twelve and seventeen ranked seven qualities of teachers in order of preference. The results showed that they liked a friendly relationship with their teachers and that a close personal relationship with their teachers contributed to the solution of some of their difficulties. A liking for the teacher contributed to a liking for the subject taught. Unfair punishment was found to be useless and the pupils liked discipline based upon respect and liking for the teacher. A liking for wide interests in the teacher increased as the pupils got older.

EVANS, K. M. (1946). **A Study of Attitude towards Teaching as a Career.**

Unpublished M.A. Thesis, University of London Library.

A test of attitude towards teaching as a career was constructed and administered to 211 School Certificate candidates in eight grammar schools in England and Wales. Little difference was found between the attitudes of subjects in different parts of the country. Of a number of other variables considered, attitude to school seemed to be most closely correlated ($r = +0{\cdot}36$) with attitude to teaching as a career. Achievement as measured by School Certificate results and attitude to working with the hands were both negatively correlated with attitude to teaching as a career. Neither the socio-economic level of the home nor the possession of relatives and/or friends who were teachers appeared to have any relationship to the attitude, but pupils whose interests were mainly academic or social had a significantly more favourable attitude than those whose interests were mainly practical.

THIMME-GOWDA, T. V. (1948) **A Study of the Attitudes of Teachers in England towards their Course of Training.**

Unpublished M.A. Thesis, University of London Library.

An attitude scale was drawn up dealing with different sections of the course of training.

1. Principles of Education: Theory and Practice.
2. Educational Psychology.

3. General Subjects (History, Geography, etc.).
4. Non-academic Subjects (P.E., Music, Art, etc.).
5. School Practice.

This scale was administered to 198 students in three two-year and one emergency training college and scores on it were intercorrelated with one another and with teaching success. Attitude to school practice correlated with teaching success to an extent of +0·208 (5% significance). Other attitude scores gave insignificant correlations with teaching success.

Attitudes to self, to society and to teaching work were also investigated. None of these correlated significantly with teaching success, though they did with some of the other attitude scores.

CHAMP, J. M. (1948). **A Study of the Attitude of Women Students, Teachers and Former Teachers towards Teaching as a Career.**

Unpublished M.A. Thesis, University of London Library.

An attitude scale given to 466 sixth form girls, training college, training department and emergency training college students, teachers and former teachers showed that the last was the only group having an unfavourable attitude to teaching and that there were no significant differences between the attitudes of teachers in different types of school. The most frequent causes given for withdrawal from the profession were marriage, overstrain due to weak discipline, other more attractive work, ill-health and retirement, and a dislike for dealing with people in masses. Salary and prospects of promotion were not mentioned. It is suggested that success sometimes depends on the conditions of work encountered and that apart from these the characteristics most likely to predispose to success in teaching are good intelligence, a good background, emotional stability and good health.

SKINNER, W. A. (1949). **An Investigation into Assessment of Teaching Ability in Teachers of Technical Subjects.**

Unpublished M.A. Thesis, University of London Library.

In any teaching situation there are three focal points to be considered, the teacher, the pupils, and the material arising during the activity. With this in mind a rating scale was drawn up and 87 students training for technical teaching were assessed on it. Correlations between scores on this rating scale and a global assessment of teaching ability were +0·88 when unweighted and +0·90 when weighted.

Factorial analysis was used and it was concluded that the ability to stimulate and arouse interest, the ability to evoke pupil co-operation, and the ability to make the lesson material of value to the pupils were those which made the highest contribution to teaching ability.

LOVELL, K. (1951). **An Investigation into Factors Underlying Teaching Ability in Primary and Secondary Schools with a View to Improving the Methods of Selecting Potential Teachers.**

Unpublished M.A. Thesis, University of London Library.

A large number of emergency training college students were assessed on twelve traits and the results correlated with Practical Teaching marks. Intercorrelations of the assessments showed a marked halo effect, and all correlations were positive. Factor analysis of the results showed that three factors were sufficient to account for teaching success. These were described as:

1. Intelligence and the willingness to use it in the education of children (57·1% of variance).
2. An empathy factor, the ability to appear live and interesting to children (5·6% of variance).
3. A speech factor (3·1% of variance).

The remaining 34·2% of the variance was contributed by specific factors.

In a group of students tested for the Cattell Primary Personality Factors of intelligence, cyclothymia, general emotional stability, dominance and surgency, it was found that students below the criterion level on all except dominance were likely to be average or below average teachers. There was no significant relationship between teaching marks and dominance.

BIRCHMORE, B. (1951). **A Study of the relationships between Pupils and Teachers in Certain Classes in a Secondary Grammar School.**

Unpublished M.A. Thesis, University of London Library.

This study aims at obtaining a greater understanding of the reasons why relationships go wrong between pupils and teachers. A list of qualities affecting the staff's pleasure in teaching individual boys, and a second list of qualities which the boys liked in their teachers were drawn up. The staff assessed all the boys according to the pleasure they obtained in teaching them and a group of 48 boys was chosen for more detailed study.

It was found that the boys' achievement rather than the effort they made contributed to the teachers' pleasure in teaching, and that there was a possible connection between the occupations of the boys' fathers and the staff's pleasure scores. The pupils held more complimentary opinions of the staff's qualities than the staff did of those of the pupils. The subject being taught appeared to affect pupil-teacher relations, and, where a teacher taught two subjects, relations appeared to be worse in the second subject.

Qualities which detracted most seriously from the staff's pleasure in teaching the boys were those such as laziness, disobedience, inattention and insolence which were liable to be interpreted as attacks upon the teacher or as leading to such attacks.

The thesis includes a number of case studies of individual pupils.

Burroughs, G. (1951). **Selection of Students for Training as Teachers.**

Unpublished Ph.D. Thesis, University of Birmingham Library.

An analysis was made of the results of using head teachers' reports, structured interviews and various intelligence and other tests in the selection of students for training as teachers.

It was found that estimates of teaching suitability were based mainly on non-cognitive qualities and that acceptability at school depended on social and athletic qualities. In the interview superficial qualities such as speech, manner and appearance were important and maturity and scholarship were minor factors. Using a schedule reduced the unreliability of the interview.

The interview results were affected by the adjustment of the candidate to the interviewers. The number on the panel was not important, but it was important that the candidate should be seen in as many situations as possible, so that different aspects of his behaviour could be observed.

For all practical purposes, tests, reports and interviews were unrelated and supplied different evidence about the candidates.

Waddington, M. (1952). **An Investigation of the Effects of Contact with Children in Play Centre or Junior Club in Relation to the Training of Teachers.**

Unpublished M.A. Thesis, University of London Library.

In a survey of the use made of play centre or junior club work in the training of women teachers, questionnaires were filled in by 738 students of whom 479 helped in play centres and 259 did not. Individual interviews followed. Fifty-three per cent. of those who helped said that they found the work interesting and valuable because they had been able to observe children at play and therefore learn something of their interests.

In two of the colleges studied, students who had play centre experience did, in fact, improve their teaching mark more than those who had no such experience. A written examination paper showed no difference between the two groups. Centres allowing free play were more useful than those using formal, organised activities. The lecturers who used play centres in teacher training were enthusiastic about their value to the students.

Uttley, G. W. (1952). **A Study of Some Aspects of Personality in Relation to Teaching Ability for a Group of Students in an Emergency Training College.**

Unpublished M.A. Thesis, University of Birmingham Library.

The students in an emergency training college were asked to rank each other in order on leadership, co-operation, emotional stability, mental alertness, sympathy with tact, persistence, and expressiveness of personality. Positive correlations were found between all these traits and assessments of teaching ability made by tutors. In the case of leadership, mental alertness and emotional stability the correlations were significant.

A study of the best and worst teachers suggested that students who obtained high teaching marks also had high intelligence, but that high intelligence did not necessarily result in high teaching marks. For infant teachers other qualities were more important than intelligence.

There did not seem to be any connection between interests and teaching marks.

EVANS, K. M. (1952). **A Study of Teaching Ability at the Training College Stage in Relation to the Personality and Attitudes of the Student.**

Unpublished Ph.D. Thesis, University of London Library.

Pencil and paper tests designed to measure various aspects of resourcefulness, sociability, interests, interest in teaching and attitude to teaching as a career were administered to students in three training colleges and one University Training Department. Marked differences were found between the test results of students in different colleges and between the scores of sub-groups of students in one of the colleges, and it was clear that it was not possible to establish general norms but that separate norms would have to be established for each group of students.

When the test scores were correlated with Practical Teaching marks variations in the results were again found, and no test gave a significant level of correlation with all groups. Most of the correlation coefficients were small, but not smaller than those obtained in comparable aptitude studies using small, pre-selected groups of subjects. Attention is called to the contrast between these coefficients and the much higher ones frequently obtained when personality ratings made by college tutors, rather than objective test results, are correlated with teaching marks awarded by the same tutors.

PHILLIPS, A. S. (1953). **An Examination of Methods of Selection of Training College Students.**

Unpublished M.A. Thesis, University of London Library.

Tests of intelligence and English were applied to a group of training college students but the results showed little relationship to their teaching marks. A controlled projection test gave more promising results. Scores on a number of personality attributes were obtained from answers to this test, and three gave appreciable product-moment correlations with teaching marks. These qualities were called sympathetic understanding of children, friendliness and good disposition, and emotional stability. Their correlations with teaching marks were +0·27, +0·71, and +0·59 respectively. Their multiple correlation with teaching marks was +0·81.

ROBERTSON, J. D. C. (1953). **The Guidance and Assessment of the Practical Work of Graduate Student Teachers.**

Unpublished M.A. Thesis, University of London Library.

A list of 50 attributes considered to contribute to success in practice teaching was drawn up after consultation with eighteen supervisors. Analysis showed that these attributes could be arranged in eight groups, in order of importance, under the headings:

Attitude and insight in dealing with others.

Attitude and insight in learning to teach.

Teaching abilities.

Range of personality.

Attitudes as teacher.

Personality qualities: temperament and bearing.

Practical abilities.

Physical abilities.

It was found that the supervisors could be divided into three groups according to their points of view:

1. Supervisors who made special cognitive approaches to the attributes or who had special ways of perceiving teaching ability.
2. Supervisors who considered attributes associated with affective or interpersonal aspects particularly important, or who had special ways of responding to these aspects of teaching ability.
3. Supervisors who placed special emphasis on the process of developing teaching ability, or on conative aspects of learning to teach.

As a result of this work an experimental report sheet for rating graduate student teachers was drawn up, and its validity and reliability tested. These were considered to be satisfactory.

WALTERS, A. D. (1957). **An Investigation into the Value of Various Types of Information in the Selection of Training College Students and an Estimate of the Validity of Certain College Results.**

Unpublished M.A. Thesis, University of Liverpool Library.

The final examination marks and teaching assessments of students in three training colleges were compared with various data used in their selection. School certificate results gave the highest correlation with college examination marks, but their relationship to Practical Teaching marks was very variable. School estimates of intellectual ability were of doubtful value in predicting success but interview estimates of intellectual ability and personality were sometimes useful.

A follow-up study of some former students of one of the colleges showed that there was some correlation between professional success and success at college.

CORNWELL, J. (1958). **Sociometric Analysis in a Residential Training College.** Unpublished Ph.D. Thesis, University of London Library.

This thesis gives an account of the construction and validation of a near-sociometric test to predict the final performance, as measured by total course results, of men students in a two-year training college. As a result of experiments with three separate groups of students a test was evolved which could be administered early in the second term of a six term course. This test gave a rank correlation of +0·67 ±·064 with final course results, and of +0·57 ±·078 with final teaching marks. When the test was combined with examination results and first year teaching assessments the Pearson correlation with final results was +0·75 ±·048.

It is claimed that this test identifies early in the course those students whose final performance is likely to be weak. It also is said to differentiate between students who are likely to fail the course and who should be advised to leave, and those, who, though weak may be expected to pass if given help at the onset of their difficulties.

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SIR PETER DAVID INNES

We regret to record the death of Sir Peter Innes at the age of 80 in December last.

Sir Peter was very active in the early development of the *National Foundation for Educational Research in England and Wales* of which he became the first director in 1947. The three years of his leadership were difficult ones during which a new and untried organisation had to win the confidence of the educational system, and at the same time take on an administrative structure. It is mainly to Sir Peter that the N.F.E.R. owes its excellent and flexible constitution and effective system of committees. He, too, began the method of work which has developed into a close partnership with local education authorities and teachers in the conduct of research.

Under his leadership the series of studies of allocation procedures, the survey of rewards and punishments, work on school record cards, and on the educability of cerebrally palsied children were begun. During his period of office the Foundation acquired the present premises and developed two now familiar aspects of its work—the test construction programme and research activities initiated in response to demands from the public educational system.

The Council, Committees and Staff of the N.F.E.R. deeply regret the passing of one whose contributions to education in this country were varied and very great, not least in that part of it with which we are concerned.

THE INTELLECTUAL POWERS OF SUBNORMAL CHILDREN

by Asher Cashdan

Pinsent-Darwin Student, University of Cambridge

General Background

TEACHERS, and doctors, have long been interested in the educability of subnormal children. Most people have heard of Victor, the wild boy of Aveyron, upon whose training and education Itard lavished such care at the end of the eighteenth century. Later, Séguin, during his work at the Bicêtre, evolved a detailed scheme for the education of institutionalised imbeciles (see Holman, 1914). But these were relatively isolated experiments, and it was not until the very end of the nineteenth century that there were any large-scale systematic studies of the subnormal child. This is not surprising, for until a society has universal and compulsory schooling, educational activity will automatically be focussed only on those who plainly benefit from it. The Education Act of 1870 marks, in this country at any rate, the earliest date at which one could begin to speak of universal education.

Granted a universal system of education, particularly one with a basis of ' payment by results,' the problems of the child who does not make normal progress at school will soon obtrude themselves upon administrators as well as upon teachers. So that Binet's (1905) pioneer work on the testing of intelligence had a two-fold significance. Not only did he throw light on children's intellectual development; he also produced an essential educational tool, which made it possible to classify children by an objective standard. Thus, reliable estimates of the incidence of different grades of subnormal children in the school population could now be made. Binet's (1905) intelligence scales were designed specifically for this purpose, and he made few claims for their value in establishing aetiologies or prognoses. " Our purpose is to be able to measure the intellectual capacity of a child who is brought to us in order to know whether he is normal or retarded . . . we have nothing to do either with his past history or his future . . . and we leave unanswered the question of whether his retardation is curable, or even improvable " (p. 37).

Binet's scales were seized upon eagerly, and adapted for use both in this country and in America. It is to such work that we owe the concept of Mental Age, and the Intelligence Quotient which was calculated by comparing the child's Mental Age with his real (or chronological) age. The pioneer work of Burt (1937) on London school children, and Lewis's (1929) large-scale survey in the twenties, were made possible by the development of individual and group tests. This work provided a means of answering such pressing questions as: how many children in the schools are backward by more than a year, or what should be the range of I.Q.s in a system of special schools catering for a fixed proportion of the school population?

But with the exception of Burt's monumental studies, little attempt was made to find out anything about the subnormal child himself. He was indeed backward; but was the backwardness curable—and what measures could be taken to help him? Were subnormal children entirely like normal younger children? The answers to such questions were pushed largely into the background. In some measure the mental testing movement's very success drew attention away from these issues. True, Galton had considered the possibility of examining the structure of intelligence, and was perhaps the originator of the multifactorial theory of abilities. But the significance of this was not really exploited by educationists, and even the mental testers have been slow to move away from the global mental age approach.

Thus, in the first forty years of this century, although great attention had been paid to classifying children, little advance had been made in understanding their handicaps. McPherson (1948) surveyed the literature and could quote only fifteen studies of learning in subnormal children—and in at least five of these the number of such children examined was no more than a dozen. It is little wonder that a pessimistic attitude prevailed towards the education of subnormal children, and that the emphasis was on their limitations rather than upon their abilities.

The past fifteen years have, however, seen a great change. A new generation of psychologists in England, such as O'Connor, Tizard, Clarke and Gunzburg, has begun to examine the intellectual and temperamental characteristics of subnormal children in detail. They have shown that a positive approach to the problems of the subnormal yields surprising results, and their work has already been of practical help to those engaged in the work of teaching, training and guiding the subnormal.

The main concern of this paper is to discuss recent work on the intellectual powers of subnormal children. The major issues which we shall examine are:

1. *The meaning of subnormality.* Backwardness and retardation—how dull are subnormal children?
2. *The causes of subnormality.* Is heredity or environment more important —do all subnormal children have damaged or abnormal brains?
3. *Learning in the subnormal.* Are particular processes affected, or is the deficiency an all-round one?
4. *Educational and preventive measures.* Can we do much to reduce the numbers of subnormal children—what can we do to improve their education?

The Meaning of Subnormality

A variety of terms has been used in the past to describe subnormal children. They have been called dull, backward, retarded, feeble-minded, and defective. In this paper we shall normally use only the term subnormal, and thereby avoid making distinctions that are of limited practical value. For example, a distinction has often been made between a dull and backward child, who is supposedly subnormal in all respects and essentially unlikely to improve, and a child who is merely retarded, that is, temporarily behind in one or two subjects, but who is basically normal or even superior. Underlying this distinction is the rather naïve assumption that intelligence test scores reflect only the child's innate capacity, and are completely unaffected by experiences during schooling (see Clarke, 1958). Nor is the distinction a valid one educationally. Vernon (1958) makes this point succinctly: " Research evidence gives very little support for the claim that higher I.Q. children overcome their ' retardation ' more rapidly than low I.Q. children."

It is important to realise that decisions about subnormality are arbitrary. First, the ability levels set for special schooling, or for placement in a training centre, are matters of social and administrative convenience only, being related to available facilities and to the average standards of particular schools. Secondly, the measurements we make are relative. I.Q. as measured by standardised tests, only indicates an average level of performance on a series of mental tasks at a given time. To say that a child has an I.Q. of 70 tells us what proportion of children of a certain age, in an appropriate population, would perform better (or worse) than he does, but it does not do more than this. In fact, the proportion of subnormal children in a community is a fixed one, as far as I.Q.s go. This is because tests are designed to produce a fixed number of children with I.Q.s above or below any given figure—and the scores are assigned accordingly—at the risk sometimes of making the actual measurement of abilities subordinate to the mathematics of test construction (see Heim, 1954). If we really want to know how children in general compare with their parents, we must use large populations and special procedures in making our measurements. The report of the Scottish Council for Research in Education (1949), though cautious, suggests that children are now brighter, and certainly not duller, than their parents.

We shall now examine a careful and detailed definition of subnormality drawn up by Edgar Doll (1946), the American psychologist, and designer of the Vineland social maturity scale. He says that a diagnosis of mental deficiency should satisfy six points. There must be:

(1) social inadequacy,
(2) intellectual retardation,
(3) developmental arrest,
(4) constitutional defect.

In addition,

(5) the condition must persist into maturity,

and

(6) be essentially incurable.

If any of these conditions are not fulfilled, the diagnosis is not acceptable. The first two points must be considered together; it is as important that a child (or adult) be able to get on with his fellows, and conform to the general demands made of him at home and at work, as it is for him to perform well at school subjects. In fact, as Zazzo (1960*a*) has pointed out, subnormal school children who are well-adjusted socially often cease to be considered subnormal when they are adult. This explains why follow-up studies such as those of Baller (1936) and Charles (1953) in the United States show such good employment and marital records among those earlier classified as defective; a paper by Stein and Susser (1960) reports similar findings in this country. O'Connor and Tizard (1956) have also shown that in teaching skills to institutionalised subnormals, one must select on social as much as on intellectual grounds. Zazzo (1960*a*) stresses, however, that while we are fairly good at predicting a child's future intellectual powers on the basis of present test results, we are relatively poor at predicting social adjustment.

Doll's third and fourth points are much less acceptable. If a child's development is arrested this implies an earlier period of normal functioning, of which there is not often much proof. If, on the other hand, we mean that development has come to an end, recent evidence is against such an assumption. In fact, O'Connor and Tizard (1956) have shown that subnormals often improve intellectually in their late 'teens and twenties, and may reach their final level much later than normal adolescents. Nor can the theory that the defect is always constitutional be safely held nowadays—a point which will be amplified in the next section.

Doll's last two criteria make it clear that he is aware of the danger inherent in labelling a child in a final way while he is still developing. Nevertheless, he seems to be searching for some formal, static entity of pure deficiency. If only all the criteria could be satisfied we would have a clear group of real defectives! But we recognise nowadays that formal classification, if it can safely be used at all, is essentially provisional and temporary. It is much safer to have a definition which suits a specific purpose. Thus, it is enough to say that a child is subnormal if he is unable to perform as well as a specified proportion of children of his own age at ordinary school tasks. Decisions about his schooling (special class or school, or training centre) will depend upon what sort of child he is, what attainments he has, and what progress he is likely to make—and I.Q. is only one of the relevant indicators.

The Causes of Subnormality

It has been argued that there is no need to postulate any cause for subnormality. Subnormals, it is said, merely represent the bottom end of the normal distribution of intelligence. But this argument really masks a confusion. Naturally, if we assign everyone a place on the 'ladder of intelligence' someone will be at the bottom. The question that still has to be asked is why is this particular child bottom of the class, or rather why can he not do things that most children can do; in the same way, we want to know why some children can do far more than most others of their age. The intelligence scale itself merely describes—it does not explain. The confusion appears to have its roots in the assumption that ability depends entirely on heredity, and that hereditary endowment itself is a matter of pure chance. In fact, neither of these assumptions is justified.

In some cases one can say definitely why the child is subnormal. Perhaps he is a mongol, or a previously normal child who has sustained serious brain damage in a motor accident. But such cases are a minority, particularly among the less severely subnormal in our Special Schools and Classes.

More typically the child suffers from a number of minor defects—malnutrition, vague ill-health, minor maladjustment, bad home or parental conditions, with the possible addition of a half-hearted diagnosis of ‘ fits while teething ’ to suggest brain damage. In these cases psychological factors used to be greatly underestimated: subnormals were considered to have imperfect or damaged brains, and their experiences in life were not taken into account in diagnosis. If no brain damage could be demonstrated, it was assumed that this was due to our lack of the techniques required to diagnose it.

We should note, in this context, one of the few experiments on conditioning with subnormal subjects, reported by Franks and Franks (1960). They found that in eyelid conditioning subnormal subjects known to be organically affected showed poor conditionability, but a second group of subnormals not known to be organically affected conditioned as well as normal subjects. This result would not have been predicted by those who assume that all subnormals are ‘ brain-injured ’ even where there is no medical history of brain pathology.

It has long been clear that environmental factors are important in mental development and that the psychological as well as the material conditions in which a child grows up play an important part in determining his mental level (see Lynn, 1959). But this realisation has brought in its train complicated arguments as to the proportion of mental growth that is to be attributed to heredity on the one hand, and environment on the other (see Maddox, 1957; Floud and Halsey, 1958, and Warburton, 1958). In fact, it is clear that heredity, psychological and physical environment are all relevant, and that attempts to estimate their precise relative importance are unfruitful. As Hebb (1949) has pointed out, if the environmental conditions are perfect, the hereditary endowment will fix the upper limit of development, and vice versa.

For the teacher, naturally, environmental conditions seem more important, particularly if it seems possible to help the child by manipulating these conditions. We shall, therefore, give rather more attention to work in this field. It is not new to argue that the line dividing mental illness from mental deficiency has in the past been drawn too sharply; or indeed that the causes of both will often emerge from a careful examination of the child's early relationships (see Bowlby, 1958; Davis, 1954). Kent and Davis (1957) have also produced evidence to show the relevance of the type of discipline in the home to later intellectual development. Further insights are, however, being gained by comparing infant development with new work on animals (see Davis, 1961). To take one example, Pfaffenberger and Scott (1959) have examined the methods of training guide dogs for the blind. They found that not only is the quality of treatment the dog receives important, but that the age at which he receives it is crucial. In particular, if the dog is not handled by human beings at an early enough age, he never makes proper relationships with them.

Other work with animals is summarised and discussed by Moltz (1960). He emphasises an important point. Ducks and other animals start following their mothers at a very early stage. It used to be thought that this behaviour was instinctive, but it is now known that its emergence is dependent on the circumstances of the first few days, or even hours, of life. In fact, we can explain following (or ‘ imprinting ’ as it is called) as a learned response of the animal, without needing an instinct theory at all.

Some caution is necessary in translating such findings to the much more complex conditions of human learning. Nevertheless, it is reasonable to expect that an increasing proportion of the variation in human personality development may eventually be found to be attributable to the child's experiences in life, rather than to the vagaries of hereditary endowment.

If this is so, we shall look forward to further testing of the theory of critical periods for the development of various skills and qualities (see Davis, 1957). According to this theory there are particular periods when the child is most able to develop certain skills. In speech development, for example, 9-15 months is the significant period for learning to listen, 12-24 months for beginning to make meaningful sounds, and 3-4 years for developing the complex motor skills needed in mature speech. This theory can explain different handicaps in children—the disturbing events may have occurred at different stages in development. If the relevant skill is not learned during its critical period, it is much harder to acquire later, either because of developments in the central nervous system, or more likely because the child has by-passed the skill and learned to do without it, or rather to avoid it—so that relearning is a painful process—as, for example, with backward readers. Learning to read, for the older child, involves not merely learning a skill, but modifying a whole pattern of adjustment.

A rather different approach is exemplified in work by Stott (1959). Where hereditary factors are considered important by some writers—say in left-handedness or schizophrenia—it is customary to postulate some kind of dominant or recessive trait according to the incidence of the condition in the relatives of the patient (see Hallgren, 1950; Roth, 1957). Stott, however, has attempted to isolate a type of constitutional deficiency which is not inherited, but is a result of conditions during pregnancy. He compared 188 subnormals with normal controls, and found an association between handicap in the children and a stressful pregnancy, the mother suffering from anxiety and ill-health, particularly during the last three months of the pregnancy. Many of these children suffered from a personality handicap which he calls "unforthcomingness," and Stott associates this with the intellectual deficiency. The handicap was not related to early ill-health in the child nor to cultural inadequacy in the home. There was no special history of maternal deprivation or break in the family structure, though there was some association with the general stability of the mother. Naturally, these factors are not all easy to assess, and it could be argued that a stressful pregnancy would be typical of a mother who had a reluctant attitude to childbirth, and who would later provide a very poor climate for normal development (see Clarke and Davis, 1961). Further work here should include the careful examination of mothers' backgrounds and attitudes.

Learning in the Subnormal

Attempts have been made in the past to understand the psychology of subnormal children in terms of very general theories. On the whole these are unsatisfactory, because they do not allow for the differences between the many types of subnormality. Nor do they specify sufficiently clearly how they apply in the complexities of ordinary life.

In this section we shall, therefore, be paying most attention to studies which have attempted to deal with well-defined situations. These will be grouped under three headings.

(*a*) *General theories*

Strauss and Lehtinen (1947) discuss the problems of the brain-injured child, and make suggestions for educational treatment. But they do not specify the precise nature of the disturbance. For instance, they say that " such a child may show disturbances in perception, thinking and emotional behaviour, either separately or in combination." They recommend that the classroom situation be as free as possible from distracting elements, so as to help the child to develop his power of sustained attention—a characteristic deficiency in the brain-injured child. However, their analysis is descriptive and not experimental. They produce no precise evidence either of the nature or of the circumstances of the child's inattentiveness or of the mode of operation of the ' cure.' They are also, one suspects, inclined to assume brain-damage upon no further evidence than the psychological behaviour of the child.

We must contrast this work with that of Stott (1959) quoted above. Stott's analysis of both the aetiology and the behaviour of the unforthcoming child is fairly precise. Nevertheless, we need to know how the unforthcoming child's passivity and lack of engagement in the learning situation operates in detail. Bruner (1961) has discussed the learning blocks of some children of normal intelligence, and his finding that their emotional problems cause them so much anxiety that they are unable to learn normally, merits comparison with the syndrome described by Stott in the case of subnormals. The subnormals' problems may be of the same type as those of the ' normal ' retarded children but they may be of greater intensity, or they may have arisen through experiences at an earlier, more crucial, stage of development.

Although their approaches are potentially fruitful, neither Strauss's nor Stott's work has produced much specific information about subnormals' learning failures. An important general theory was, however, advanced by Kounin (1943), and it has been tested experimentally. Kounin discusses two aspects of mental development: differentiation and rigidity. A child's responses are not differentiated: if he is hungry he gives up (or tries to) all activities except those which will help to satisfy his hunger. The hungry adult on the other hand, can be hungry " with a part of himself " while carrying on with whatever he is doing. Two points are involved. The adult has a greater number of psychological regions than the child; in addition, these are more distinct from each other, so that one can be stimulated and the others left unaffected. Subnormals differ from both normal adults and children in that as they grow older, their psychological regions do not increase in number, but their separation from each other (i.e., the thickness of the " boundaries " between them) becomes greater even than in normal adults.

The theory helps to explain the rigidity of the subnormal—why he cannot easily shift from one type of activity to another (as in sorting tasks) and why, when he does shift eventually, he will happily persevere with the second task as though he were starting anew. Kounin demonstrated this effect by showing that subnormals had a lower percentage of " co-satiation " than normals. If they were asked to draw cats and, when they gave up cats, to draw other animals, normal children drew each succeeding animal for a shorter period, but the subnormals spent almost as long on the last as the first. To these subnormal children each new animal presented a new task, but to the normals it was just more of the same task! Kounin's experiments have some flaws, and his approach has been criticised by Werner (1946). But his theory needs to be extended and clarified rather than discarded.

(*b*) *Psychological profiles*

(i) *Verbal and performance ability.* Duncan (1942) was perhaps the first modern English educator to stress not merely that subnormal children could be educated, but that the education should be in accordance with their unique combination of abilities and defects. Duncan claims that the children in his school were backward in verbal abilities, but that their non-verbal intelligence was practically normal. Accordingly, he devised a scheme in which the teaching was based only on practical activities, and where formal education was approached only indirectly through the needs of the task in hand. Thus, boys learned reading if they had to understand gardening instructions, and arithmetic when they had to make purchases. There is much good teaching method in this approach, and Duncan is right to stress the verbal poverty of many subnormal children, but his view is nevertheless extreme. Most subnormal children are relatively normal in non-intellectual fields, but where intellectual abilities, such as learning, planning, comparing are needed, there is no evidence that their handicap disappears when the task is not in verbal form.

(ii) *Binet score composition.* However, Duncan rightly drew attention to the need for mapping the abilities and disabilities of subnormal children. It has become fashionable recently to speak of them as 'slow-learning,' but this is either a platitude (they are slow-learning by definition since they have taken longer to reach the same stage as normal children) or else it needs much more precise statement. Subnormality has most frequently been defined in the past in terms of performance on the Binet test. This test, however, is really a whole series of different subtests tapping a large range of abilities and basing the final score on a kind of average. It was natural, therefore, that investigators should ask whether if one compared normal and subnormal children who obtained the same total score, characteristic differences would be found in the score's composition. For instance, one might expect that subnormals, being older, would have performed better on tests such as Vocabulary where greater experience might help them, but that they would perform poorly on tests requiring mental agility, such as Digit Repetition. In a detailed study, Thompson and Magaret (1947) found that there were a number of items which differentiated subnormals and normals of the same total score, but that these could not be grouped into any meaningful pattern. They concluded that the best approximation that could be made was to McNemar's "general factor" of intelligence. This is not much better than saying that on items where 'intelligence' was important the normals did better! More recently, Zazzo (1960*a*) has carried out a similar analysis of

Binet scores and he points out that for normals and subnormals the order of difficulty of items is not the same; but Zazzo, too, fails to provide a systematic explanation of the pattern of successes and failures.

(iii) *The psycholinguistic profile.* A natural reaction to the failure of this approach is to attempt to design tests where the significant disabilities of subnormal children—in the verbal field—can be examined in detail. One such attempt has been made by McCarthy and Kirk (1961). Their test battery, known as the Illinois Test of Psycholinguistic Abilities, follows a model of Osgood's and examines linguistic ability along three dimensions: processes, such as decoding and encoding; channels, such as auditory and visual; levels, such as automatic and representational. There are nine subtests, and one obtains a clinical profile. A child may, for instance, be poor at auditory decoding, in other words his understanding for speech is relatively poor, but he might be quite good at vocal encoding, that is at expressing himself. However, the authors are not concerned to show that subnormals have a characteristic pattern of success and failure, but rather that each child has his own ' profile ' and that knowledge of this enables one to design effective remedial programmes. An earlier version of this battery, known as the Differential Language Facility Test, was used by Sievers and Rosenberg (1960).

(iv) *Zazzo's general profile.* The more general question of the subnormal's overall spread of abilities has been explored further by Zazzo and his co-workers (1960*a*). They have used a large battery of tests as well as the Binet-Simon, and have carefully compared the performances on their other tests of children who have similar Binet scores. They classify abilities into three broad groups: spatial organisation, verbal intelligence and psycho-motor efficiency. They have found a typical pattern for the subnormal child. His spatial organisation scores (e.g., ability to copy Bender figures) are appreciably worse than his verbal intelligence scores, but psycho-motor efficiency (e.g., in cancellation and dotting tests) is almost at the average level. Thus, the typical profile they give is of a child whose verbal Intelligence Quotient is 70, and who has Developmental Quotients of about 60 in spatial organisation and 90 in psycho-motor efficiency (see also Zazzo, 1960*b*). It would be most valuable to carry out similar tests with subnormal English children to see if this pattern is found again. However, we can already see that Zazzo's approach is more sophisticated than that of Duncan. Duncan suggests that the subnormal perform all non-verbal tasks better than verbal tasks, whereas Zazzo helps us to see that non-verbal tasks vary greatly in their relationship to formal intelligence scores.

Zazzo goes further. He argues that the unevenness of performance described by him is typical of the true subnormal child and that children who are retarded equally on all measures are likely to be ' pseudo-defectives,' and have a better prognosis. This thesis is supported by a study by Netchine (in Zazzo, 1960*a*). She found that a group of children with uniformly poor scores on all tests made a far greater improvement in twelve months than a group with similar Binet mental ages, but with Zazzo's typical uneven pattern on other tests. Further work is needed to confirm these results.

(v) *Learning through different sense modalities.* Bartlet and Shapiro (1956) advocate a more specific approach. They point out that by well-designed experimentation one can make detailed individual diagnoses even in areas where standardised tests are not available. They describe the diagnosis and remedial treatment of a dull boy with severe learning difficulties and psychiatric symptoms; his disabilities were then analysed in terms of the different sensory modes through which learning occurs. For instance, he could learn quite well within one sense-modality, where, say, all the work was in the visual sphere, but had great difficulty if he were required to use tactile and visual cues together. Bartlet and Shapiro's approach, in spite of the inherent difficulty of drawing reliable conclusions from a single case, could well lead to a great extension of our understanding of individual learning difficulties.

We have mentioned above that subnormals have particular difficulty in the verbal sphere. Luria (1957) discusses the role of language in the child's mental development, and stresses its importance in his learning to control his actions and to make generalisations. O'Connor (1958) enlarges on this thesis with respect to the subnormal child and his deficiency in the ability to abstract and to use symbols. Speech has both directive and self-instructive functions. For example, when young children were told to press a button when a green light was shown, but not to press if the light was red, they would in fact press whenever either light came on. If, however, they were taught to say " Press " and " Don't press " to the two lights, they could learn to control their actions. Like younger children, subnormals seem to be particularly poor at following general verbal instructions, unless these are repeated at frequent intervals (see Hermelin and O'Connor, 1960*a*).

In conclusion we should note the experiments which have been carried out by Hermelin and O'Connor on the learning of defectives in and across different sense-modalities. They found (Hermelin and O'Connor, 1960*a*) that when responses had to be made in the same modality as the stimulus, the performance of imbeciles was poorer than when they had to respond in a different modality. If the stimulus was a pencil tap and the response required was two pencil taps, they often merely copied the experimenter; but if the response to tapping was to be counting, or vice versa, their performance was much improved. In the first case they would apparently respond without " thinking about it." If, however, they had to count when the experimenter tapped, they were forced to attend and made fewer mistakes. This effect is quite different from the case of Bartlet and Shapiro's boy who found difficulty in working across modalities, but who was a much less dull child with special difficulties of a dissociative kind. In a subsequent experiment (O'Connor and Hermelin, 1961) they show that in recognising pictures and names of objects, imbeciles perform better in cross-modality than in like-modality learning. On the other hand (Hermelin and O'Connor, 1961), in stereognostic shape recognition (involving the feel of objects) imbeciles performed better even than normals of like mental age (though this was not true of mongols). Perhaps the intellectual component in this task is less important than in the earlier ones, and the abilities needed are more of the kind that Zazzo calls psychomotor efficiency, in which these children are hardly retarded at all.

(*c*) *The learning process*

We have already seen that although techniques have long been available for rating the performance of subnormal children on various scales, we are only now beginning to find out the characteristics of the learning of such children. We still need to pursue Binet's suggestion in 1905: " Il se peut que nous réussissions un jour à dégager des signes d'arriération psychologique tout à fait indépendants de l'age " (quoted by Zazzo, 1960*a*). A specific illustration of this point is that although different children may have the same mental age, this is not necessarily highly correlated with present learning ability.

(i) *The subnormal child as a ' slow-learner.'* It has become common to speak of subnormal children as ' slow-learners.' But the term is not usually explained. The suggestion seems to be that they pass through the same stages of development, in roughly the same order, as other children, but at a slower rate. If one accepts Zazzo's thesis, this must be qualified by noting that the slowness is not uniform in different developmental fields. Furthermore, according to the disorder theory of mental retardation, such children may well have developed normally at first and then have changed radically as a result of unfavourable circumstances (see Davis, 1961). However, there is some evidence to support the slow-learning theory in the study of such children's later progress. In a series of papers Woodward (1959, 1960*a*, 1960*b*) has reported on the development of idiots, using methods based largely on Piaget's developmental sequences. She has found that in almost every case development is along the same continuum as that for normal children, but that the rate of progress is much slower, each stage taking longer to work through. Similarly, Mannix (see in Lunzer, 1961) studied the number concepts of educationally subnormal children, using eight of Piaget's tests. He again found the expected sequence of stages and got the same type of answers as those given by normal children. O'Connor and Tizard (1956) have also pointed out that, in industrial training, subnormals often take longer to learn a skill, although their eventual level of performance may not be much below that of normals (see also Clarke, 1960).

Nevertheless, Zazzo (1960*a*) is one of the few workers who has amplified the slow-learning concept. He makes two points. The subnormal child, because he has been stationary for some time at a particular stage of development, has over-practised a particular type of response and this makes it harder (as Woodward, 1960*b* has also noticed) to change to a new and better level of functioning later. It is this factor in part that is responsible for the subnormal's rigidity. In addition, because of his slowness in learning, he is further away in time from the next stage in a learning process than the normal child, and this helps to explain why the subnormal might drop behind him, even when both start at the same level.

One should note, however, that neither these studies nor the theoretical formulations actually provide much positive evidence for the slow-learning hypothesis. By definition the subnormal child has taken longer to reach the same level as his normal fellow. If we merely say that he is slow to learn we are encouraging ourselves not to enquire too deeply into his failures in the learning situation. But we must ask what he does not do, or perhaps what he does do that is different from the normal child's behaviour.

(ii) *The learning ability of children at the same mental age.* If we take a normal and a subnormal child who both have the same Binet mental age, we may say with fairness that their mental level is about the same, and Woodward's (1959, 1960*a*) work supports this.

Nevertheless, it is not circular to ask how the normal child's learning ability is better than the subnormal's. After all, in a year or two's time the normal child will have gone ahead. House and Zeaman (1958) show that, in a discrimination learning task, I.Q. was in fact related to learning ability in children of the same mental age. However, there are flaws in this study; for example, their effect obtained at the mental age of four but not at five, and they expected the child to realise that this was a learning situation without telling him so. Hurtig (1960) found that, comparing normal with subnormal children on a test similar to Raven's Matrices under two conditions, (1) where the principle of the task was explained, and (2) where it was not explained, both groups of subjects benefited from the explanations, but under both conditions the normals improved on a second administration much more than the subnormals. Although the subjects were matched on mental age their initial level on the experimental test was not the same; one may perhaps be dealing with events at a different point on the same learning curve. But again there is some support for the thesis that younger children will learn better than older ones of the same mental age. In a transposition experiment Stevenson and Iscoe (1955) report an incidental but similar finding.

(iii) *Transfer of training.* A related problem is that of transfer of training. It is usually assumed that transfer is one of the most potent forces in intellectual development. This assumption has been attacked, but much more because of the faculty psychology that underlay it, than because children's ability to generalise was being seriously questioned. Thus, it is possible that subnormals suffer from an impairment in the ability to generalise what they learn. As Bruner (1961) suggests, they may have to learn everything *de novo*. This could be for strictly neuro-pathological reasons or, more likely, because the child has withdrawn from learning situations which have been painful for him in the past, and is not willing to go beyond the limits of what he has actually learned. In fact, we shall quote studies in the next section which show that subnormals are able to generalise, but perhaps not as well as normal children.

McPherson (1948) found very few studies in this field, and few have been published since. She quotes Woodrow (1917), who reported a study in which there was no difference in percentage transfer between normals and subnormals, but his work is open to some criticism (see O'Connor, 1958). McPherson's main conclusion seems to be that in an area where it has been difficult to plan systematic and well-controlled experiments, the findings of successive investigators have been consistent only in their variance with one another! Clarke and Blakemore (1961) draw attention to Harlow's (1949) work on transfer in animals. Three aspects of transfer may be distinguished: learning "set," that is, getting used to the kind of task that has to be done; improvement in perceptual discrimination; the development of concepts. It may be that the subnormal child is not equally poor at all of these three. Preliminary work by the writer of this article suggests that interference with the conditions in which the learning is taking place, even where the task is unaltered, creates especial difficulty for the subnormal. This effect would come under the first of Harlow's headings. But all three need thorough exploration.

Educational and Preventive Measures

Much of the research in the post-war period has been concerned not so much to show how subnormals differ from normal children, but to show that it has been too readily assumed that certain possibilities of development are closed to them. Not only have we the work in industrial training of O'Connor and Tizard (1956), and of Gunzburg (1961), but we have more academic researches showing that imbeciles can learn to use abstract concepts (see Hermelin and O'Connor, 1958). In another study Hermelin and O'Connor (1960*b*) show that imbecile children can, to some extent at any rate, learn to read, and Clarke and Blakemore (1961) in an experiment with transfer of training report that young imbeciles show large improvements with practice, in at least the early stages of a perceptual-motor learning task.

Teachers in Special Schools and Training Centres often complain that the children reach them too late; if they had them earlier they could do much more with them. Evidence is beginning to accumulate in support of this claim, and of the allied one that even severely subnormal children make more progress if they are in an educational rather than in a custodial atmosphere. Tizard (1960) has described the Brooklands Experiment, in which 16 imbeciles were transferred from a mental deficiency hospital to a special unit in which they were given the kind of treatment which is to be found in a modern residential nursery. After eighteen months they had improved both in verbal powers and in social adjustment far more than had a group of matched controls who had remained behind. Similarly, Brandon and Slomson (1960) describe a class of thirty imbeciles in the same hospital. Half of them were given the old-fashioned set lesson, occupation centre treatment. The others had a nursery school régime, with continuous organised free play. Early evidence showed that the children in the latter group were making more sounds than the others, and were more continuously occupied. Kirk (1958) has shown that pre-school (i.e., nursery) education helps the subnormal, particularly if they come from poor homes. He claims that this "suggests a socio-cultural aetiology rather than a purely genetic one." This conclusion does not necessarily follow (see Clarke, 1958). But as most of the children in our Special Schools do come from poor environments (Susser, 1960), Kirk's findings have particular significance in this country.

In work with subnormal children it is commonly assumed that the best plan is to start with the child's strong points and work from them. The most seriously defective aspects are not concentrated upon. There are three possible assumptions:

(1) The weaknesses are permanent, so one can only strengthen the residual abilities—this would be a very pessimistic view.

(2) Drawing the child's attention from his weak areas and giving him success in other fields may so increase his general confidence that he will be able to come back to these areas later and improve them (*cf.* Duncan, 1942).

(3) The remedial exercises may be specially designed so as to strengthen the weak areas indirectly (as perhaps in Bartlet and Shapiro, 1956).

The second and third of these approaches are sound pedagogy, but there is a fourth possibility, that of designing special methods for strengthening the weak areas, and we should not neglect this approach. After all, there are many situations where direct methods are profitable.

We have said something of educational measures, but we should not forget preventive measures. Some improvements in medical science are two-edged. Fewer children may be born damaged, and new cures developed for some who are. But improved medical care will mean that far fewer children will die in early life. For instance, there must now be far more mongols who have survived childhood and adolescence than used to be the case. Perhaps the most significant advances in the preventive field will be made when some of the problems in family relationships and early development mentioned in the section on aetiology are further disentangled. This is an area of growing co-operation between teachers, doctors and social workers, and one where each can learn much from the others.

Concluding Discussion

Throughout this paper no distinction has been made between work on educationally subnormal children and on the severely subnormal (or defectives). This has been deliberate. There are no theoretical grounds for deeming some children educable and some ineducable; the question seems to be one of degree of educability, and we have quoted evidence to show that the severely subnormal respond gratifyingly to education. Where there are particular types of learning failure, these are usually found in greater degree among the severely subnormal and in lesser degree among more mildly retarded children. For instance, in the study referred to above, this writer found a significant difference between normal and severely subnormal children. An intermediate group, of educationally subnormal children, showed the same effect as the severely subnormal, but in lesser degree.

Research is proceeding along various lines. The most profitable approach at present seems to be the exploration of the learning abilities of normals and subnormals of the same mental age. This should make it possible eventually to specify the processes and the mechanisms that are different, or missing, in the learning of the subnormal. We cannot yet provide general rules to cover the learning of all mentally handicapped children, but new insights are fast being developed. Work with the subnormal is no longer a dead end, but a challenging and rewarding vocation.

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RESEARCH ON THE EDUCATIONAL TREATMENT OF DEAFNESS

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Note:

The article which follows departs in certain respects from the usage of this journal, notably in the detail of the references in the text and in the use of a certain amount of essential technical terminology. Such departures are, we consider, inevitable and indeed desirable in so thorough and concise a summary of the present state of our knowledge in a most important field.

Editor

RESULTS of recent researches on the educational treatment of deafness and associated problems that are basic to it have been extensively summarised in:

A. The report on the *International Conference on Audiology*, held at Washington University and Central Institute for the Deaf, St. Louis, in 1957.

B. *Educational Guidance and the Deaf Child*, a book published in 1957, covering researches at Manchester University, 1952-56.

C. The report of the International Congress on the *Modern Educational Treatment of Deafness*, held at Manchester University in 1958.

D. A review, chiefly of American investigations, by L. M. DiCarlo, Syracuse University, N.Y., in 1959, in a special volume of *Educational Research*, Washington, D.C., 1959.

The trend of the very numerous researches of the past decade has been massively indicative of a need for further investigation under many heads. In this article reference is made to four groups of problems that appear to demand prior attention.

(1) Development of Capacity for Speech Perception and Use of Spoken Language by Children Suffering from Very Severe or Profound Deficiencies of Auditory Acuity.

Results of surveys of the distribution of auditory acuity (hearing losses) among pupils in special schools for the deaf have indicated a proportionately greater incidence of profound deafness than has been noted among deafened adults. In the Medical Research Council's report *Hearing Aids and Audiometers* (1947) it was stated that 93·2 per cent of the deafened adults studied in investigations prior to the design of the Medresco hearing aid, had hearing losses averaging less than 80 decibels at 1000 and 2000 cycles per second. H. Davis (1960) has described hearing levels above 90 decibels (British Standard) for pure tones at 500, 1000, and 2000 cycles per second as constituting total impairment for hearing everyday speech.

K. P. Murphy reported a survey of 800 pupils (all those aged 12 years) in thirty-six schools for the deaf and partially deaf in the United Kingdom and Eire (*Educational Guidance*, 1957). Van der Meer (1957) reported tests of the 229 pupils in the Institute for the Deaf, and of 92 pupils in the associated school for hard of hearing children at Groningen. From New Zealand, D. M. C. Dale, in 1960, supplied unpublished results of tests of 307 children in schools for the deaf. Results are set out in the following Table I.

Table I

Hearing Levels (P.T.A.) of pupils in Special Schools for the Deaf and Hard of Hearing

	PERCENTAGES OF CHILDREN		
Hearing Levels	(1) Under 60 decibels	(2) 60-90 decibels	(3) Over 90 decibels
Murphy (800 cases)	28	34	38
Van der Meer			
Institute for the Deaf (229 cases) . .	4	27	68·5
School for Hard of Hearing (92 cases) . .	49	41	10
Dale (307 cases)	16	32	50

Deaf children with hearing levels over 90 decibels, with histories of deafness dating from birth or from before the age of 2 years, present most acute problems in educational treatment. Their deafness, in a majority of cases, is diagnosed as of peripheral or end-organ origin and as perceptive. Without powerful hearing aids they are unable to hear either the speech of others or their own voices and are thus deprived of an essential form of motivation to speech. (Cf. M. M. Lewis, 1957 and von Békésy, 1960). When van der Meer's figures for the two Groningen schools are combined, children with hearing levels over 90 decibels are found to number 50 per cent of the total, as Dale discovered in New Zealand. Surveys, now in progress, of pupils according to age groups in the Manchester, Preston and Sheffield schools, are showing a similar high incidence of profound deafness.

As a result of a ten-year study at the Clarke School, Massachusetts, C. V. Hudgins (1958 *Congress Report*) stated that children with hearing losses that may be placed arbitrarily between 70-75 decibels and 90-95 decibels (British Standard) who entered school " with practically no speech discrimination and with little or no intelligible speech, respond readily to an auditory training program and often achieve a high degree of communication skill. Many of the children in this group, following training, are able to continue their education in public schools." Hudgins's conclusion as regards deaf children who have received special education, is supported by findings at Manchester where M. Beaman (unpublished report) in an intensive study of 60 pre-school children, found that as a result of home-training with hearing aids those with hearing levels up to 75 decibels were progressing towards articulate speech without, of course, having had speech lessons.

Until very lately all published experimental evidence indicated that many children with hearing levels or losses greater than about 80 decibels could be helped in speech reception by hearing aids having adequate output potential but that for them hearing could not do more than supplement lip-reading. Hudgins (1958) described children with hearing losses exceeding 90-95 decibels (B.S.) as profoundly deaf and " Until relatively recently . . . . considered to be beyond the reach of even our best hearing aids." He described research of seven years' duration in which 50 profoundly deaf children used modern group hearing aids throughout the school day. He quoted their speech perception scores during that period. Very few of the 50 pupils were able to discriminate words by ear alone and they never reached a level greater than 25 per cent discrimination, but " the remnant of hearing when combined with lip-reading increases the speech perception ability by a significant amount," and " the scores for hearing and lip-reading combined are always superior to those for lip-reading alone."

E. Wedenberg, Laboratory of Audiology, Stockholm (1954), had described an auditory training programme for 36 pre-school children, with lip-reading excluded. Some of them were hard-of-hearing but he found that others with 85-95 decibel loss developed speech perception, by hearing alone, for a vocabulary of 150 words.

In February, 1961, E. C. Goldsack (now E. C. Ewing), demonstrated at Manchester in the University, to some 140 teachers of the deaf and audiologists, that her class of six- and seven-year-old children[1], with hearing levels from 85-105 decibels were achieving capacity to talk quickly in colloquial English, in the normal, continuous sentence-patterns of spoken language, with assimilation of abutting consonants and vowel-consonant glides (Hudgins and DiCarlo, 1939). In the new methods by which they had been taught (for nine months) use of their residual hearing was the chief factor. In three cases both parents were deaf and, with one possible exception, none of their histories indicated that they were ever less deaf than they are now.

Essential features of E. C. Ewing's new techniques of teaching are:

(*a*) a period of ten minutes work daily with each pupil using a portable speech training aid, maximum output level 132 decibels; during this, listening to sentences spoken normally, by teacher and child alternately, is combined with reading from a specially selected type of book, the teacher pointing along each line of print in such a way that phrases and sentences are indicated as units of utterance.

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[1] Pupils of the Nursery-Infant Branch, of which she was Headmistress, of the Royal Schools for the Deaf, Manchester.

(*b*) All speech by both teacher and child is uttered at a distance not greater than 4 inches from the microphone. It has been found to be essential that these profoundly deaf children should be enabled to hear their own speech by this means. Best results are obtained only when all components of speech are relatively high in intensity at the microphone. Most of the children need the maximum output of the speech training aid, the performance of which has been determined by tests with the Bruel and Kjaer high-speed-level recorder in the University Department. An aid of similar type, which was used for a week and gave noticeably inferior results with the children, was found to have a markedly inferior performance when tested in the laboratory.

(*c*) When not being given individual hearing-speech training, the children are in continuous auditory contact with their teacher, through an inductance system. She always speaks directly into a microphone and trains the children to communicate with each other in the same way, especially for instance during group lessons involving very rapid improvised dramatisations of stories.

(*d*) All children in the nursery-infant unit are accustomed to wear hearing aids from when they dress in the morning until they undress in the evening, and non-teaching staff co-operate in talking to them and expecting them to talk.

Auditory discrimination was developed by E. C. Ewing's pupils to a point at which they were able to repeat correctly phrases involving words and combinations of consonants, not previously familiar to them, such as 'a fishmonger's shop,' 'lots of sticks.' Spectographic analysis indicated that because of their deafness they heard vowel formants and consonants such as 's' imperfectly but that, in the language of communication theory, enough 'information' reached them, through hearing, for them to become able to recognise these sound-patterns as a result of the development of special skills. The need for articulation teaching through vision and touch was reduced to a minimum. The children delighted in their individual speech lessons and the tempo of their whole education was increased. Sets of sound-recordings of this experiment have been made, which illustrate the children's progress. J. E. J. John, a lecturer in audiology in the Manchester Department of Education of the Deaf, and the writer, have observed and recorded the achievement of high standards of speech-perception among severely deaf pupils at B. I. Ingall's private nursery school in Essex and some rather similar cases in schools of the Reading Education Authority. At Groningen, van der Meer (1957) has stated, about half the pupils with hearing levels over 90 decibels gained benefit from auditory training. A. van Uden, at the first International Congress on Cybernetics, at Milan in 1960, reported results of testing 81 pupils of the Institute for the Deaf, Sint Michielsgestel, who had been taught "in a cybernetic way" with group aids, maximum output 150 decibels. Using phonetically-balanced word tests their scores were:

HEARING LOSS (decibels)	PERCENTAGE SCORES	STANDARD DEVIATION
70/79	73	9·8
80/89	42	13·8
90/99	29	13·6
100/109	14	8·7
110/119	3	1·2

Van Uden defines cybernetics, used in this context, as involving special provision, by boom-microphones or other microphones close to the lips of every pupil, for them to hear their own speech greatly amplified.

This new break-through has been described in some detail because it concerns a large proportion of the 40-50 per cent of pupils in special schools for the deaf, regarded at present by many or most workers as for practical purposes totally deaf. Until recently they were often classified as deaf-mutes.

Many profoundly deaf children at present leave school only able to talk with a limited command of English, abnormal phonation, and a very imperfect articulation. Some are barely intelligible even to people who have grown accustomed to their way of speaking. Most are severely handicapped as regards communication skills and command of ordinary language such as is required in verbal tests of intelligence.

In the writer's considered opinion, systematic research on the new-found capacity of children with hearing levels over 90 decibels, who have never heard normally, to develop auditory speech perception and to learn to talk chiefly through hearing, is the most urgent need as regards research on the educational treatment of deafness. Specific researches are required under several heads.

In E. C. Ewing's experiment six-year-old children were becoming much more hearing-dependent and much less vision-dependent. Their speech was becoming motivated by hearing themselves talk, at any rate in the class-room and its high level of intelligibility was largely based on ability to compare the sound patterns that they heard themselves utter with those of their teacher, with reading as a supplementary source of information about sentence and word-forms. Investigation is required to find if very young children who are profoundly deaf can become similarly hearing-dependent during the first three or four years which are critical to ordinary children's speech development and to their development of a pattern of mental growth in which hearing and capacity for inner speech are main factors. Cases of successful early training reported and demonstrated by the late I. R. Ewing (1938 and 1958), by E. Whetnall (1955), A. M. Pickles (*Educational Guidance*, 1957), and others have included profoundly deaf children.

The time now seems ripe and urgent for a study or studies, with selected groups of children, in conditions that are controlled as far as possible, of methods and results of early training involving application of E. C. Ewing's and van Uden's methods of using special hearing aids, particularly to find how far they can be adapted to the potentialities of babies and young children in terms of maturation of their nervous systems and their general physical and mental development. A team has now been constituted at Manchester to carry out a study of this kind in the University Audiology Clinic. The pattern of medical, audiological and other forms of examination that recent research has indicated as necessary and significant to effective educational treatment, is discussed in Section (4) below.

(2) Hearing Aid Equipment.

E. C. Ewing's results were primarily based on the utterance of speech at the microphone by teacher and children, using a portable hearing aid with an ascertained maximum output of 132 decibels at 1 kilocycle per second and an effective sound spectrum from 200 to 6000 c.p.s. As has been stated already, the University's high-speed level recorder was used by M. Delany, then our Leverhulme Research Fellow, to determine this performance. Testing 44 unused and 115 used wearable aids with the same equipment he found considerable variation in their performance but concluded that the best Medresco aids, with a maximum output of 120 decibels at 1 kilocycle per second could give little or no help to children with hearing levels over 90 decibels. This maximum output is only achieved if speech reaches the microphone at a loudness level of 70 decibels. Some of the commercial aids that he tested were more powerful but none equal in performance to the speech training aid. There can be no doubt of the urgency of the need to study the possibilities of a new type, or types, of hearing aid for children who are profoundly deaf to use in their homes, at clinics and in schools. Dr. Klijn[1] has shown the present writer specifications of the hearing aids that he has designed to give maximum outputs up to 150 decibels. He has stated that they have been used at the Institute for the Deaf, Sint Michielsgestel, for two years, with success and without resultant deterioration in the children's auditory acuity.

We believe inductance systems are required for use by very deaf children in their homes. Short-wave radio transmissions may have possibilities. Klijn has designed aids with an upper frequency cut-off at 1 kilocycle per second for use by some profoundly deaf children. This is one means of avoiding acoustic feed-back. H. C. Huizing[2] (1957 *International Conference Report*) has originated 'triplet-testing,' a technique for evaluating auditory speech-perception within these selected bands of frequency. In Denmark hearing aids are prescribed for children and adults individually and are tested for amplification and frequency response at least once in every period of two months. Chrs. Rojskjaer (1958 *Congress Report*) has reported that by this means many defects have been found of which neither children, parents, nor teachers were aware. M. Delany's reports (1961, unpublished) on tests, in the Manchester University Department, of hearing aids used by children indicate that a large scale investigation of this problem is needed in England.

The design, materials and supply of ear-moulds for profoundly deaf children are problems urgently calling for research and Klijn and others have made some valuable experiments. Our workers report that because of acoustic feed-back, due to ill-fitting ear-moulds, volume position 3 of the Medresco aid is often the highest that can be used with children. This gives a maximum output, with those Medrescos that have the best performance, of about 100 decibels, as against 120 decibels if position 5 can be used. It reduces to a minimum the amount of help given to severely deaf children. Resorting to commercial firms, parents of severely and profoundly deaf children report that as many as three or four ear-moulds have to be made before a good fit is obtained. Similar reports have come from many schools for the deaf, although in certain hospital regions the position appears to be better.

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[1] Chief Audiologist, University Hospital, Amsterdam.

[2] Professor of Audiology, Institute of Audiology, Groningen University.

(3) Parent Guidance.

Continued investigation from our University Audiology Clinic and at the nursery-infant branch of the Royal Schools for the Deaf, Manchester, is indicating the significance of emotional problems and emotional attitudes of parents in relation to their children's deafness. Longitudinal studies which are being made with the help of D. A. Sanders, a scientific research assistant provided by the Medical Research Council, of home-trained deaf children in schools are confirming the finding of H. L. Owrid (1960) that children whose parents have had effective guidance continue to be superior in linguistic development to the non-home-trained. But most parents need help of a more comprehensive kind, especially in their homes, by suitably trained workers. The numbers of deaf children whose parents for health, occupational or other reasons are unable to give them home-training and of children from broken homes, has begun to be studied at Manchester but calls for a specific research. If, as seems possible, they constitute a significant minority special provision will be needed for their early training. I. G. Taylor (1958 *Congress Report*) has reported a fresh appraisal of the anxieties of parents and frustrations of deaf children during pre-school years as observed in the Manchester University Audiology Clinics.

(4) Diagnosis and Causation of Hearing Impairment and Speech Retardation in Relation to Educational Treatment.

Much recent research has stressed aetiological factors as significant to the educational treatment of deafness. At the International Congress on Audiology, St. Louis, 1957, I. J. Hirsh and R. Goldstein[1], W. G. Hardy[2], and N. Myklebust[3], reported having found numerous cases of deaf children with " disorders in the development of learning, comprehension and intelligence," " inability to produce and/or understand language," " auditory agnosia . . . resulting from gross damage to the auditory cortex." L. Trenque[4], in a written contribution, described " hearing residuals " that she found typical of deaf children with histories of meningitis and maternal rubella. These statements exemplify one of the new approaches to the educational treatment of deafness that has characterised some clinical and research programmes in Europe and America, in recent years. Some, if not all, of the most valuable investigations have been made by integrated teams of medical workers, audiologists, psychologists and educators on a basis of joint clinical sessions and case conferences.

There has been a definite trend, as in our experience at Manchester, in research thus organised, towards recognition of three main categories of hearing-impaired children and children with communicative disorders:

(*i*) children suffering from deafness that is diagnosed as peripheral, involving the end-organ of hearing;

(*ii*) children with auditory impairment and communicative disorders involving a great deal of sensory nervous system activity;

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[1] Central Institute for the Deaf, St. Louis.
[2] John Hopkins University Hospital, Baltimore.
[3] Northwestern University, Illinois.
[4] University of Lyons.

(*iii*) children who do not present indications of organic lesions or deficiencies but are diagnosed as either (*a*) retarded in physical or mental development or (*b*) emotionally disturbed or autistic.

Much further study is needed of the problems that are involved in the education of the children falling into the second or third of these categories. Children are sometimes found who are handicapped in terms of more than one of them, as, for example, in a recent case in which C. Worster-Drought diagnosed auditory imperception associated with inner-ear deafness.

It is beginning to be recognised by some workers that teachers of the deaf are very often confronted with a wide range of problems in special education, some of which, at least, must now be regarded as specific and as requiring forms of educational treatment that are not needed by what E. S. Levine (1956) has called, "the normal deaf child," i.e., the child whose handicap derives wholly from organic peripheral deafness. L. Minski and M. J. Evans (1961) reporting a series of problem cases have commented, "It must be demoralising for teachers of the deaf to have such children in their classes and children of this type have a most disturbing influence on the normal deaf child who can benefit from education in a deaf school. . ." Not infrequently, in recent years, teachers of the deaf have said to the present writer that they knew that, say, nine out of ten children in their classes would benefit from a specified form of teaching but that they felt themselves to be hindered from giving it because the tenth pupil could not be taught effectively in that way.

Our collaborative project, at Manchester, with assistance provided by the Medical Research Council, to study capacity to hear speech in relation to causation of deafness, has been carried out on a basis of audiological testing and otological examination. Results have confirmed the statement by Hudgins (1958 *Congress Report*) that while his three categories of deafness among children could be arbitrarily defined in terms of hearing levels[1], there is no direct or constant relationship between degree of auditory acuity, as determined by pure-tone audiometry and capacity for speech-perception, as measured by speech audiometry, except perhaps in cases of conductive deafness with a middle-ear pathology.

In our audiological-otological project, children whose deafness was diagnosed as associated with certain aetiologies were found to constitute vulnerable groups as regards capacity for speech reception by hearing alone[2]. It is evident that a differential diagnosis between conductive and perceptive deafness, apart from its medical-surgical significance, tends to have essential educational implications. There is a marked trend for children with conductive deafness to be superior in speech perception to children with perceptive deafness. As von Békésy's experiments (1960) at Harvard showed, subjects with unimpaired hearing hear their own speech about fifty per cent by bone-conduction and about fifty per cent by air conduction, between their lips and their ears.

This is a scientific fact of crucial importance in the educational treatment of hearing-impaired children. It is well known that capacity to hear their own voices and to match the sound patterns of their speech to those of people around them is basic to the linguistic development of normal children[1]. In earlier research, before the advent of electronic hearing aids that could be used by little children who were very severely deaf, we found that although their vocalisations in the earlier months of life seemed to be relatively normal, after the age of about twelve months they occurred less and less frequently and their quality deteriorated.

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[1] Personal Communication.

[2] See A. W. G. Ewing, "Education of the Deaf," *Educational Research*, Vol. II, No. 3, p. 174, June, 1960.

Children with this kind of history, who had no sort of early training, often were (and sometimes, alas, still are) admitted to school at the age of four or five years, having become voiceless. In a recent instance of this kind in which a profoundly deaf child was admitted to her school at the age of five years, E. C. Ewing found that, even with the help of the school's modern hearing aid equipment, it was only after six months of training that any phonation occurred. The factor of auditory feed-back, or capacity to hear one's own voice, is evidently fundamental to normal motivation to use it, when maturation of the nervous system has become complete. Working without hearing aids, earlier teachers of the deaf sought for non-auditory means of replacing it, such as training children to feel vibration of the skeleton during phonation, usually either on the mandible or sternum. Intelligible speech was often achieved in that way, by profoundly deaf children, as a result of expert and skilful teaching, although the quality of their voices was usually abnormal and characteristically 'deaf.' Apart from use of special techniques during speech lessons, the children had extremely little proprioceptive experience of their own phonation.

Discovery that modern hearing aids, in certain conditions, can be used as a means of providing auditory feed-back has proved capable of becoming very significant to the linguistic development of children who suffer from severe or profound deafness of a perceptive type. (Perceptive deafness involves cochlear or retro-cochlear deficiencies or lesions). It has been shown that, using powerful portable hearing aids, or powerful wearable aids and inductance systems and speaking within a few inches of a microphone, children with hearing losses over 100 decibels can be enabled to hear their own voices, with enjoyment. As E. C. Ewing's experiment, already described, has demonstrated, far more natural voices result when the children are trained in this way. Much more research is needed on the provision of auditory feed-back for deaf children and the technological, electronic problem of enabling them to experience it continuously by means of wearable hearing aids. Distance between a child's lips and the microphone of his aid and the resultant attenuation of its intensity is proving a serious difficulty.

Children who suffer from deafness of a conductive type retain a normal channel of continuous auditory feed-back because, unlike children whose deafness is of perceptive type, they can hear their own voices, without hearing aids, by bone-conduction. They present, therefore, a very different, and in general, a much less difficult educational problem. Provided that no other handicap is involved, such as severe mental retardation or central damage, they can acquire normal speech and become capable of successful attendance at ordinary schools, although special training, at least in the use of hearing aids and in lip-reading, is often a necessary preliminary to this.

In our Department's collaborative projects with our sister Department of Otolaryngology and with the E.N.T. Department in the Royal Manchester Children's Hospital, attention is being especially focussed on the treatment of conductive deafness in childhood. In the survey that we are making with the co-operation of the County Health Department, of children with impaired hearing in the administrative County of Cheshire, we are studying both the incidence of conductive deafness and its educational treatment in numerous cases in which it has become chronic and established.

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[1] *cf* J. E. J. John (1961), also G. W. Gray and C. M. Wise (1959), also G. A. Miller (1957).

It is important to teachers of the deaf who are made responsible for giving hearing-impaired children training in the use of hearing aids, or for their education in special units, that their auditory condition should be known. L. Trenque at the St. Louis Congress urged that audiometric bone-conduction testing of children's hearing should be made regular practice.

As regards auditory discrimination for speech phonemes, most of the results of tests of children's hearing by speech audiometry that we have so far collated and published, were obtained with children on first referral to our clinics by E.N.T. consultants and school medical officers, before they had opportunity to become expert hearing-aid users. References in Section (1) of this article to the work of E. C. Ewing, B. I. Ingall and A. van Uden have shown how capacity to develop auditory speech-perception, in relation to causation of deafness, as a result of training, is proving a promising subject for research.

K. Harrison (1958 *Congress Report*) stated that 105 children out of a total of 354 whom we had seen in joint clinical sessions in Manchester, were suffering from deafness the causation of which could not be diagnosed on examination and by retrospective enquiry. He considered that its diagnosis would be greatly facilitated by its detection at earlier ages through the use of screening tests of hearing such as were originated by the late I. R. Ewing. He believed that this would make it possible to reduce the number of 'aetiology unknown' cases. J. C. Johnson (book in press) has stated that, among the 120 Cheshire County children who are pupils in special schools for the deaf or partially deaf, causation of deafness is reported to be unknown in 50 per cent of the cases.

The need to investigate causation and its significance to educational treatment on a broad front, (including disabilities in auditory speech-perception, as well as auditory acuity and also disabilities affecting symbolic formulation and expression, involved in linguistic development) is emphasised by reports on the very wide range of educational problems now to be met in special schools and units for the deaf and partially deaf.

In a boarding school for 84 deaf children of nursery-infant ages the writer has found that in 20 cases deafness is stated to be associated with other handicaps. In the U.S.A., P. V. Doctor (1959) reported that 10 per cent of 28,000 hearing-impaired children were multiple-handicapped and that this percentage had increased during post-war years. L. Meyerson (in Cruickshank, 1956) listing many handicaps other than deafness that he had noted among pupils whom he had examined in American schools for the deaf, wrote, "Some of these children had physiological impairments of hearing so mild that they probably would not be handicapping if it were not for their other disabilities. Other children had severe losses of hearing but the hearing impairment was not their greatest problem, nor the major contributing cause of their behaviour."

L. M. DiCarlo (1959) and L. Minski (1958) studied diagnostic techniques and found that, even under optimum conditions, tests may fail to differentiate deaf, brain injured, mentally retarded and emotionally disturbed children. "Characteristics in common are unresponsiveness to sound, delayed vocabulary, speech and language development and backwardness in communicative processes."

In Manchester, I. G. Taylor, Lecturer in Clinical Audiology in our Department, with the collaboration of N. Gordon, Consultant Neurologist, Booth Hall Hospital, has investigated a group of children who have been presented for diagnosis (Taylor, 1961). Most frequent causes of referral have been lack of response to sound, or lack of ability to communicate by speech. Many of the children have subsequently proved not to have deficiencies of auditory acuity. In a number of cases Taylor and Gordon have found that there are cortical and lower brain-stem lesions which militate against the development of language. Taylor's research has involved three forms of approach. Firstly, he made clinical observations of children over a long period of time with investigations in the conscious state. He has studied some children during many years, noting their language and responses to sound. Secondly, children have been carefully examined neurologically by Gordon and Taylor. Thirdly, children have been examined in the sleep state by special techniques which were first described and devised by H. Davis, the well-known American neuro-physiologist.

Taylor has found that in some cases sleep audiometry reveals capacity for normal response to sound although results of subjective audiometry indicate severe deafness. This occurs when there is marked impairment of the central nervous system and, in some cases, normal responses to sound, only obtainable by objective testing during sleep, are subsequently confirmed by subjective testing, but not until two or three years later.

If, as seems to be indicated, lesions of the central nervous system are causing children to over-inhibit their responses to sound, this investigation may lead to findings of considerable therapeutic significance. Children who, in the conscious state, cannot perceive speech and use it in communication are now having their responses to sound in sleep more fully examined.

Apart from this group, which in itself comprises a complete study, Taylor has investigated pupils in a school for the partially deaf who are presenting problems to teachers. Their difficulties are particularly related to learning and language. They constitute approximately 10 per cent of all the pupils. Another group of children, deafened as a result of meningitis, presented behaviour problems rather than learning difficulties.

Many children in the first group had suffered from brain-injury in infancy with either a mechanical or a bio-chemical cause. On examination sensory difficulties of parietal-lobe nature were found to be frequent. Many of the difficulties of integration known to exist in cerebral-palsied and brain-injured children, so well documented by W. M. Cruickshank (1955)[1], were found to exist in a minor degree in some of the children classified as partially deaf, and receiving education as partially deaf pupils.

Much research is needed to find the incidence of such cases in an adequate sample of the special school population. We have evidence that they are to be found in schools for the deaf, as well as in schools and units for the partially deaf. Some are found in schools for cerebral-palsied and educationally sub-normal children. Investigation would show how far the incidence of children who leave special schools without adequate means of communication is attributable to environmental factors, such as late ascertainment of their handicap and variations in the continuity and quality of the educational treatment that is given to them, and how far to innate neurological and physiological causes.

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[1] Professor of Education and Psychology, Syracuse University, N.Y.

Cruickshank (1955), and R. S. Illingworth, Professor of Child Health, Sheffield University (1958), have published books in which principles and methods of educating cerebral-palsied children are described. Cruickshank has detailed the heads under which the medical information that is needed, in individual cases, should be provided to teachers. L. Minski, Consultant Psychiatrist, Belmont Hospital, with M. J. Evans, Teacher of the Deaf in their special unit, has reported (1961) results of studying 107 children with communication disorders, a number of them previously found to constitute problem cases in schools for the deaf. He describes results of psychiatric and educational treatment, based on investigation of aetiologies, with comprehensive studies of their physical and mental development and behaviour in relation to home environment. Clearly, much further research is needed on procedures for assessing the mental abilities of children with difficulties in response to sound and in linguistic development that are not attributable to peripheral, end-organ deafness and on methods of educating them.

As a result of providing short courses in audiology, over many years, for some hundreds of medical officers and of experience of responsibility for audiology clinics in public health departments, the writer would strongly recommend that one or more regional teams be organised on a research basis to study these complex problems in the ascertainment and diagnosis of hearing and speech handicaps in children and new methods of treating them educationally. Each team, in addition to a school medical officer (or medical officer in the maternity and child welfare service) should include a qualified audiologist, if possible a neurologist, an otologist, a psychologist and an experienced educationalist who has worked with hearing-impaired children.

At the present time, a confused situation has developed with the rapid establishment of new ‘ units for the partially deaf ’ and the appointment of many peripatetic teachers of the deaf with responsibility for part-time help to hearing-impaired children in ordinary schools and children of pre-school age who are not considered to have responded normally to sound. Members of our Manchester team have found children, presenting the very varied kinds of problem that have been described in this section, placed in units for the partially deaf as well as in special schools for the deaf and partially deaf. It is very difficult, as Minski and Evans have stated, for teachers of the deaf to deal with their specific needs.

It is suggested that the possibility should be investigated of training selected teachers of the deaf to work with children suffering from other handicaps—for instance, to combine and assimilate the kind of special educational treatment that is provided for deaf children with that which is appropriate to children handicapped by cerebral-palsy in its varying forms. As yet, no course for training such teachers is provided and in dealing with multiple-handicapped children, teachers of the deaf are left to develop their own methods. The only exception is the unit for 15 deaf-blind children at Condover Hall, Shropshire, provided by the National Institute for the Blind.

(5) Mental Health and Social Adjustment of Children with Defective Hearing.

Further research is required to elucidate the extent to which life in a hearing, sound-communicating world involves inevitable deprivation for hearing-impaired children and how far hearing aids can be designed to diminish this far more effectively. It is important that the serious limitations for many deaf children of present hearing aids should be much more clearly understood.

With the trend towards more frequent placement of deaf and partially deaf pupils in ordinary schools, there is an increased need to investigate the extent to which such placement involves a risk of undue mental stress on account of communication difficulties and the problem for a deaf child of maintaining the same tempo in education as is possible for children with unimpaired hearing. The latter can follow what is quickly spoken to them while, for example, they are looking at text books or engaged in practical tasks. The writer's own experience has been that some children with strong personalities, characterised by courage and persistence in such classroom situations, can successfully attend ordinary schools, but that in many cases their success is dependent on previous special educational treatment and preparation. J. C. Johnson, of our Department, reporting a close psychological study of 68 partially deaf children who were pupils in ordinary schools, concluded that guidance and special training for them, their parents and teachers in ordinary schools, was a *sine qua non* for success. I. R. Ewing and others, who lost hearing and became dependent upon hearing aids for their auditory experience, have described how, without their aids, the instant-to-instant information that they receive from their environment, e.g., the sound of their own movements, even of their own footsteps, is drastically reduced or rendered wholly inaudible. With hearing aids (unless binaural) localisation of sound is impossible and sounds of daily life are very much distorted. All this, combined with difficulty in speech-communication, makes for a sense of insecurity. For children who have never heard normally there is greater deprivation. They have no memories of complete sound patterns that will help to give meaning to what they hear incompletely and imperfectly through hearing aids.

In a previous article, the writer has quoted E. S. Levine (1956), a consultant to the Federal Office of Rehabilitation and one of the staff of the Psychiatric Institute, New York, who reported having found evidence of " emotional under-development " and a " markedly restricted life area," as a result of a study of 31 " normal deaf " girls. She did not study the girls' adjustment to life after they had left school. M. E. Numbers (1958 *Congress Report*), on the other hand, investigated the after-school careers and social and occupational experience of 225 former pupils of the Clarke School for the Deaf, Massachusetts, and stated, " The data indicates that our graduates succeed in getting along with hearing people to a remarkable degree."

The results of these investigations indicate clearly a need for research on problems that are even more fundamental. No analogous experimental or clinical studies have been made of the effects of sensory deprivation that deafness imposes on the mental development and mental health of children. Priority has inevitably been given to research on sound as a medium of communication through speech. In recent years reports have been published of results of depriving normal subjects, temporarily or for relatively short periods, of all auditory and visual experience[1]. Emotional effects have been described as very severe and hallucinations are said to have occurred. I. R. Ewing and other authorities on deafness have emphasised the extent to which very severe or total loss of hearing reduces a person's contact with his environment. Adults who have undergone this deprivation have used such descriptions as, " All the world seems dead," although they were not handicapped visually or in any other way. Without auditory experience children grow up ignorant of the sounds that are characteristic of almost every kind of movement made by man and his machines, animals and the forces of nature. The sounds characteristic of the routine of home and school are unknown to them. Their deprivation of auditory feed-back extends not only to their phonation and speech but also to control of their other forms of bodily movement throughout their waking hours. Those who have care of deaf children are trained to avoid subjecting them to experience of total darkness, even in their beds at night.

The whole of this problem calls for extensive investigation. For example, little children with unimpaired hearing are stimulated to go and see what is making a noise, for instance when daddy is coming home and opens the front door, mummy begins to lay the table, an older brother winds up a toy, a dog barks outside. Is it possible that without auditory stimulation as an essential part of all his daily experiences, a deaf child's progress in motor development and the acquisition of physical skills as well as his intellectual curiosity and general mental growth are subnormally stimulated? Is this a factor, for example, that contributes to the lateness in walking that has been reported by some workers, such as Kendall (*Educational Guidance*, 1957), as of frequent occurrence among deaf children? Further to all this, of course, is the question of the extent to which deprivation of auditory experience involves mental security and emotional development.

With the availability of adequately powerful and wearable hearing aids, the potentialities for deaf children of inductance systems as already partly explored, and the achievement of proof that all but a small minority of deaf children can be enabled to hear at least some sound, an attack can be made on these basic problems.

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[1] Leiderman, H. *et al*, " Sensory deprivation; clinical aspects," (1958) referred to by Di Carlo, L. M., *Review of Educational Research* (1959).

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THE MEASUREMENT OF PERSONALITY—II.

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The individual interview

RATINGS are sometimes based on a person's behaviour in a controlled situation, such as the interview, but most psychologists would agree with the N.U.T. Consultative Committee of 1947 on *Transfer from Primary to Secondary Schools* that the interviewing of children for purposes of selection is thoroughly undesirable for several reasons:

(1) it puts a considerable strain on many children so that the behaviour observed may be quite uncharacteristic;

(2) the interviewers are liable to be impressed by the ' wrong ' things, such as deportment, dress, accent and the like. Since these largely reflect social class and age, they may in fact simply help in picking pupils who will lower the schools' academic standards but will adjust themselves well to its social life, thus spuriously reinforcing the interviewers' confidence in the soundness of their judgements;

(3) a large amount of evidence from war-time research has confirmed psychologists' doubts as to the consistence of interviewers and the validity of their judgements of personality.

So far as interests, personality and suitable home background are concerned, the report of the child's teachers, who have known him for several years, is, despite its imperfections, more likely to be trustworthy than the impressions gathered in fifteen or so minutes under highly artificial conditions. Equally to be deprecated are attempts to assess brightness or attainments by a few haphazard oral questions.

In general, whenever conclusions derived from interviewing are allowed to outweigh the evidence from test scores and scaled teachers' estimates, the accuracy of prediction is likely to be worsened far more often than it is improved. With regard to eleven-plus selection, for example, statistical evidence suggests that if two schoolmasters independently interviewed 100 candidates for a grammar school, and each picked the 20 best in his opinion, they would agree on 9 of their choices only and disagree on 11. Vernon and Parry quote studies where particular psychologists or personnel selection officers (P.S.O.'s) were notably successful in picking recruits for Service employments or for officer training. However, the P.S.O. in the Army or Navy had a record of the candidate's success on a number of intelligence, educational or aptitude tests and his answers to a biographical questionnaire.

No investigation seems to have been made of grammar school headmasters' interviews, but it is very doubtful whether they have any appreciable value. This does not mean that the teachers cannot judge suitability for secondary schools at all, but that the valuable element in their judgements is already incorporated in the ordinary school marks.

Himmelweit's research on the selection of students at the London School of Economics is even more devastating. Interview judgements by a board of university teachers showed zero validity when checked against degree marks 1 and 2 years later, i.e., they might have drawn the names from a hat with equal advantage and less inconvenience, whereas a short entrance examination gave small positive predictions of success, and a battery of aptitude tests considerably better predictions. Warburton reports that the interviews held for entrance to the Department of Education at Manchester University have shown significant, but low, correlations with success in teacher training. These students were recent graduates, however, so that the interviewers had the advantage of knowing the applicants' full school, and university, records. It was also found that a series of separate interviews by a single person is more efficient than interviewing by boards of assessors.

With regard to psychiatric interviews, Vernon points out, " there is no evidence that psychiatric interviews or psychologists who make use of the concepts of abnormal psychology are any more capable of making more valid educational or vocational predictions than those trained in normal and applied psychology. However valuable the medical approach may be in therapy, the bulk of research has little to contribute to selection or guidance."

The group interview and observational techniques

Group interviews based on the observations of groups of people under controlled conditions have been used a great deal at the War Office Selection Board, by the Civil Service Commissioners, and in industry. They have also been used to a small extent in selection for grammar schools, training colleges and universities in Britain.

Group procedures have been used by Allen, Langan and Warburton in the selection of women students wishing to take courses in teacher training. These candidates were examined in small groups by various procedures. In *free discussion* the topics discussed had an educational bias, e.g., " Education comes from the family, not from the subjects taught in schools," and, " A mother's place is in the home." In *controlled discussion* the topics were a little more difficult but the candidates were helped by the comments and the questions of the observers. Topics included, " Adults in the community do not readily accept the teacher as one of themselves," and, " Hard slogging at disagreeable tasks is the essence of the educative process." Students were asked to discuss these problems with particular reference to their own experience. Observers noted the response of each individual as a member of the group, whether she took the lead, listened to others, drew the group together and eased tension or disrupted the group, offered a different opinion from the one held by the majority, appeared to be at ease as a member of the group, found the situation difficult, etc. A grading for personality was given on such observations. A grading on the intellectual content of each member's contribution to the discussion was also made. This was judged on the quality of her remarks, her ability to follow a line of reasoning, to clarify a situation, to bring the discussion back to the topic if it had been side-tracked, and to sum up the discussion.

For the *teaching period* candidates were given a page of carefully selected information to study. Scientific subjects were chosen for the arts students and arts subjects for the science students. This was done in order to give each student as far as possible the same chance of showing his ability to teach from unfamiliar material and to eliminate the possibility of a science student, for instance, being given a subject in which he had already specialised. Subjects such as ' Hans Anderson,' ' Air,' and ' The Houses of Parliament ' were used. About fifteen minutes were allowed for the preparation of a lesson from the notes provided, and candidates were told that they could teach directly from their typewritten sheet or amplify the material as they wished.

Staff meetings were held to discuss problems such as, " Parents have complained of Billy Brown who is bullying children on the way home from school." Each candidate took it in turn to take the chair as head of the school, while the rest of the group acted as members of staff. Although only the person conducting the meeting received marks for this activity, notes were kept of the contributions made by the rest of the group, and these observations were taken into account at the final grading session.

A small booklet was prepared which described an imaginary grammar school. This dossier included a map and gave details of the catchment area, the number of staff and pupils, school rules and time-tables, clubs and societies, etc. A fairly vivid description of the headmaster and the second mistress was included, with some comments on their attitudes and standards. At the end of the booklet were twelve problems concerned with school organisation, the house system, school clubs, homework, out-of-school activities, and so on. Each candidate was allocated a problem to be dealt with in the staff meeting over which she presided. The panel came to two agreed ratings (viz., on personality and on the intellectual contribution) for each student. Points noted were:

(1) the student's ability to state the problem clearly and apply it to real situations;

(2) how and when opinions of other members of staff were invited;

(3) the student's ability to control the meeting and keep it to the point;

(4) ability to summarise and bring the meeting to a close.

The students also had conventional individual interviews. The results for 128 students were followed up in three colleges. The criteria of success were:

(1) grades in the Teacher's Certificate Examination in Practical Teaching;

(2) grades in the Teacher's Certificate Examination in the written papers;

(3) personality assessments made by members of the college staff on the students' suitability for teaching;

(4) a general assessment based on college work during the year.

As the original interviewers were not acquainted with the students' academic records, and the training college staffs were not aware of the interview grades, the results are free from the usual halo effects.

Mean correlations were as follows:

Criteria

Predictors	*Practical Teaching*	*Exam. Papers*	*Personality Assessments*
Individual Interviews	+·30	+·15	+·35
Staff Meetings	+·33	+·19	+·34
Group Discussion	+·30	+·12	+·44
Teaching Attempt	+·19	+·00	+·29
Final Grade	+·42	+·23	+·28

Thus, although the teaching attempt was a comparative failure, probably owing to the inexperience in teaching of the candidates, the other group techniques (Staff Meeting and Group Discussion) were a slight but definite improvement on the conventional individual interview. It is encouraging that the personality assessments (especially in the group discussions) showed some correlation with the students' subsequent behaviour in college.

Wiseman has developed a form of ' observed activity ' for the borderline candidates in an eleven-plus examination. The programme is based on the hypothesis that borderzone children are all about equally weak academically, and if they have other handicaps as well they are more likely to fail in the grammar school. Those who are able to get on well with other children, who appear stable and sensible, and who are constructive and effective in dealing with practical problems are thought by the examiners to be more likely to succeed in the grammar school than whose who exhibit opposing traits. The procedure is based mainly on techniques developed by War Office Selection Boards, but also owes something to the experiments made by Clarke in selecting girls for admission to the Manchester High School for Girls before the last war.

The chief procedures used were:

(1) observed activity. The children, in groups of 8-16, are given various outdoor tasks to do, such as erecting a tent, drawing a large plan of a fort on the playground, building things with assorted ' junk,' or making a ' bridge ' with tubular scaffolding;

(2) observation of range of interests. The children are placed in a classroom containing a large variety of exciting things including books, games, toys, material for drawing, painting, modelling, sewing, etc. They are given free scope to do whatever they wish during a fairly long period (45 minutes);

(3) observation of lessons. The children are observed in a class while they are being taught two separate lessons. These are based on material which is likely to be new to the children, e.g., the idea of positive and negative numbers, codes, a first lesson in a foreign language. Both oral and written answers to questions are used.

Each group of children has two or three observers, who make notes throughout the day and finally decide on an overall assessment. No attempt is made to rate separate qualities such as intelligence or stability: the observer simply rates the children on the basis of ' grammar-school suitability.' Independent assessments are first made, and the final agreed assessment is arrived at by discussion. The average correlation between observers approximates +0.80. The results have been followed up by comparing these border-zone acceptances with others immediately above them in total test scores (who did not undergo the special procedure). No difference between the two groups was found after eighteen months in the grammar school; but after $2\frac{1}{2}$ and $3\frac{1}{2}$ years there were fewer children assessed ' unsatisfactory ' among the border-zone acceptances. There appeared to be no difference in the numbers with high ratings for grammar school success. The method is too elaborate and time-consuming to be readily applied to more than about two hundred children a year in a typical L.E.A. area. It amounts to an extended interview, especially devised to meet the difficulty of interviewing children, and it has the advantage of giving a greater measure of justice to those children who have just reached grammar school standard.

Personality Questionnaires

It is clear that most investigations of personality variables cannot be based on ratings which need special supervision, organisation and attention to the requirements of research design. Investigations in which the untrained classroom teacher can play a part during school periods will obviously have to be based on standardised tests and questionnaires, similar in nature to tests of ability and attainment. These questionnaires are easy for the amateur to make up and the popular press often prints questions of the type " Do you like to wear (*a*) trousers, (*b*) skirts? (3 marks)." It is easy to hold the conviction, as in the case of intelligence tests, that anyone can sit down and write questions, without regard to the statistical requirements of sampling, reliability, difficulty levels, discrimination, norms, factorial analysis, and so forth, on which a test must be based if it is to be reliable and have good predictive validity. Personality questionnaires are fairly widely used in the States, but are less commonly applied in Britain. The questionnaires available in this country are almost entirely American, designed for adults, and are concerned with adjustment, motivation and psychiatric symptoms rather than the major personality variables derived from statistical research with which the present article is concerned. The best tests are probably those of Eysenck, Cattell and Guilford, described below. For adults Eysenck has constructed the Maudsley Personality Inventory (M.P.I.) which gives measures of Neuroticism and Extraversion, such as:

Extraversion

Are you happiest when you get involved in some project that calls for rapid action?
Do you usually take the initiative in making new friends?
Are you inclined to be quick and sure in your actions?
Would you rate yourself as a lively individual?
Would you be very unhappy if you were prevented from making numerous social contacts?
Do you prefer action to planning for action?

Neuroticism

Do you sometimes feel happy, sometimes depressed, without any apparent reason?

Does your mind often wander while you are trying to concentrate?

Are you frequently ' lost ' in thought even when supposed to be taking part in a conversation?

Are you sometimes bubbling over with energy and sometimes very sluggish?

Are you inclined to be moody?

Do you frequently have ups and downs in mood, either with or without apparent cause?

Cattell has published the 16 PF questionnaire, which gives ratings on fifteen personality factors, namely, Cyclothymia *versus* Schizothymia, Ego-Strength, Dominance, Surgency, Super-ego Strength, Extraversion, Emotional Sensitivity, Paranoid Tendency, Bohemianism, Shrewdness, Anxiety, Radicalism, Self-Sufficiency, Self-Sentiment and Id Pressure. These may be summed to give ' second-order ' factor scores analogous to Eysenck's two major dimensions. These tests are long (170 questions or 340 if parallel versions are used), and based on a very large amount of research work. Scales are also available for H.S.P.Q. (High School Personality Questionnaire, ages 12-18) and C.P.Q. (Children's Personality Questionnaire, 8-12 years), and scales for ages 6-7 and 4-5 are in preparation. There is as yet little research follow-up of the use of the Cattell Scales in schools. Typical questions for ego-strength (stability) at the various ages are:

Adults

Are you more annoyed by:

(*a*) unintentionally disagreeable acts on the parts of others, e.g., coughing noisily, or

(*b*) violation of manners or morals?

H.S.P.Q. (12-18 *years*)

Do you avoid borrowing things from people for fear you might damage them?

(*a*) yes, (*b*) no.

C.P.Q. (8-12 *years*)

Do you succeed in most things you try? or

Do things often go wrong for you?

Ages 6-7 *years*

On the playground:

(*a*) Do you run most of the time? or

(*b*) Do you stand still a lot?

Ages 4 and 5 years (ratings)
Seldom shows off *versus* shows off.
Sucks thumb *versus* never sucks thumb.
Unafraid of animals *versus* afraid of animals.
Never bites finger nails *versus* bites finger nails.

For adults the Guilford-Zimmerman Temperament Survey and, for assessments of anxiety, the Taylor Manifest Anxiety Scale, are also relatively reliable and based on sound research. The Minnesota Multiphasic Personality Inventory (M.M.P.I.) is often used as a personality questionnaire, although it is based largely on clinical symptoms. It has 550 statements generally presented individually, on separate cards, and sorted by the subjects into ' True,' ' False ' and ' Cannot say ' boxes. On the basis of the responses of 500 normal adults (16-55 years) and 800 miscellaneous patients in mental hospitals, a series of empirical scoring keys has been developed so that a profile is obtained showing relative scores on: Hypochondriasis, Depression, Hysteria, Psychopathic Deviate, Masculinity-Feminity, Paranoia, Psychasthenia, Schizophrenia and Hypomania. The M.M.P.I. is a clinical instrument which requires considerable skill in interpretation and even then is likely to agree with the psychiatric diagnosis in only about half the cases, although it is more successful in differentiating abnormal persons from normal.

Some difficulties with questionnaires

The main difficulty with using personality questionnaires, is, of course, that the subject may, either consciously or unconsciously, fake his answers in a way that is not possible in ability tests. It is easy to write " No " in reply to a question, " Are you irritated by people who are late? " however unreasonable you are about latecomers in everyday life. Another source of error in personality questionnaires is unconscious self-deception, i.e., that the subject may be unaware of his own ' true ' views, if true views are defined in terms of the opinion of the majority of his fellows, or in terms of his actions rather than his words: e.g., self-styled Church of England protestants who never go to church.

Alexander has compared questionnaires with psychoanalytic techniques, pointing out that the psychoanalyst would never expect to get valid information from direct questions or introspection where conscious criticism is at a maximum. And a person's notion of his personality may be determined not only by what he would himself regard as desirable, e.g., ' generous,' but also by stereotypes of himself as ' liberal,' ' sensitive,' ' lazy,' ' Bohemian,' etc. We may distinguish two directions in test-taking attitude: the tendency to be defensive or to put oneself in too favourable a light (plus-getting: faking good) and the opposed tendency to be unduly self-critical (minus-getting: faking bad). In assessing the fakability of a test, four main kinds of persons have to be taken into account:

(1) the saboteur, who can wreck any human activity, from taking psychological tests to getting married, and has to be put up with in every field of research;

(2) the ambitious (plus-getters) who aim at getting a ' good ' score, in the sense that their replies would have the approval of society, e.g., they would

probably aim at high scores in ability tests, and in such tests as ' optimism,' ' endurance of difficulties,' ' freedom from fear,' ' belief in conventional virtues,' ' distaste for the expedient,' etc.;

(3) the over-modest (minus-getters), who react in exactly the opposite way from the ambitious;

(4) the self-deceivers, who give answers that bear little recognisable relationship to their everyday behaviour.

Certain precautions may be taken to counteract faking, although none of them is fully satisfactory. For example, in the M.M.P.I. test the ? score is the number of items that the subject did not answer, or the number of items placed in the ' Cannot Say ' category. If this score is too high, conclusions based on the profile are not considered valid.

The *L* score (or lie scale) is based on answers to a group of items that tend to place the subject in a good social and moral light, but are rarely practised in everyday life, e.g., " I read the editorials in the newspaper every day; " and " I never cheat at games." A few honest people might be able to answer ' true ' to some of these questions, but very few could honestly answer ' true ' to a whole series. In the M.M.P.I. every fifteenth question counts towards the *L* score and this score is, in fact, also used as a personality variable in some researches. Its object is to spot the plus-getter who over-reaches himself. On the other hand, the *F* (face-validity) scale is aimed at spotting the self-deprecating minus-getter who undervalues himself, e.g., a person who thinks he is neurotic would probably answer ' true ' to the items (" everything tastes the same," and " I have a cough most of the time,") whereas, in fact, neurotics do not often make these claims. It has even been said that to answer ' true ' to the statement, " I am neurotic," is a sign of stability rather than of neuroticism. It seems probable that *L* or *F* scores will be built into future personality scales. The exclusion of certain persons on the grounds of high ?, *L*, or *F* scores is, however, a precaution against absurd results rather than a solution to the major difficulty of the fakability of personality questionnaires. However, blatant cheating or self-deception is the exception, not the rule. The fact that these tests may be heavily criticised on these grounds by no means completely invalidates them. The proof of the pudding is in the eating, and there is a great deal of evidence that personality questionnaires make a valuable contribution to our assessment of psychological qualities.

The Bennett-Slater is a British test in which items are well disguised by similar techniques. Three sections deal with symptoms of anxiety, hysteria and depression, but in about half the questions a negative instead of a positive response indicates neurotic tendencies, so that the testee who wants to create a good impression cannot merely check ' No ' throughout. The four sections contain lists of various types of annoying situations:

(1) frustration of self-assertion, e.g., " somebody tells you how to do your job; "

(2) personal slips, e.g., " you forget what you're looking for; "

(3) dirt or untidiness, e.g., " an unmade bed; "

(4) noise, e.g., " the sound of hammering."

Evidence is given to show that neurotics check ' slips ' and ' noise ' items as annoying much more often than normals do, whereas ' frustration of self-assertion ' and ' dirt,' affect normals and neurotics alike. The scores are based, unknown to the subject, on the difference between these types of question.

Faking is likely to be a more serious problem in selection than in guidance, since the subject's main purpose in selection is to secure as high a score as possible, whereas in guidance, whether educational or psychiatric, it is in his own interests to present both his strong and his weak points.

Another difficulty with questionnaires is that norms may be very different in different types of people, not only because people's behaviour varies in everyday situations according to their social moves, but because different classes of persons customarily adopt a different attitude to questionnaires. For example, educated persons are more self-analytical, more used to verbalising their emotional experiences, more willing to admit to themselves and to the tester the experiences described in the questionnaire. This is a matter for empirical research, and is a practical difficulty rather than a fundamental criticism of the method, but different norms may have to be employed according to sex and socio-economic status, just as these differences sometimes have to be taken into account in cognitive tests. Incidentally, different norms are not likely to be needed for different intelligence levels. The influence of intelligence on the answers given to personality questionnaires is surprisingly slight, a finding that has been substantiated in a large number of investigations from different sources. Cattell's tests include a short intelligence test, which enables a constant check to be kept on this point.

Projective Tests

Projective tests have played an important part in personality assessment, although they have rarely been subjected to rigorous statistical and experimental analysis. They arose largely as a revolt against personality tests based on particular traits, such as dominance. Insight into the personality as a whole was considered to be the primary objective by many psychologists following the Gestalt school of thought.

The Rorschach test is the most popular projection technique and a great deal of work has gone into its standardisation. On the other hand, there is a tendency for Rorschach testing to become a cult, like psychoanalysis, with the same tendency to dogmatise, and with the same implications that only the initiated can understand it and that it is immune from ordinary scientific standards of reliability and validity because it is concerned with the 'total' personality. More than a thousand books and articles have been published on this projective test alone. The Rorschach technique consists largely of seeing pictures in ink-blots, in the same way that we see pictures in the fire. Scoring is based on:

(1) mode of apperception—whether the response is based on the whole blot (*W* response), ordinary detail (*D*) or unusual detail (*Dd*), or based on white space in the blot (*DS*), etc.;

(2) the determinant—the form or shape (*F*+ or *F*–, according to aptness), colour (*C*), shading or chiaroscuro (*K*), or a response implying movement (*M*). The relative proportions of colour and movement responses yield the Erlebnistypus or experience balance—extratensive (excess of colour), introversive (excess movement), many of both types (dilated ambi-equal), few or none (constricted);

(3) content—original ($O+$ or $O-$) or common response (P); human (H), animal (A), anatomical, object, geographical, nature, architecture, plant, etc.

Thus, intelligence is said to be shown by good form, original and movement responses, but an excess of W (whole response) shows a more abstract and synthetic, of D (detail) a more practical, and of Dd (unusual detail) a pedantic, kind of intellect. Colour is claimed to correspond to emotionality, and if the colour responses show little influence of form, this emotionality is poorly controlled. Movement responses represent a rich inner life rather than overt emotion, somewhat like Jung's introversion, and the various kinds of shading responses show sensitivity and anxiety. Some of the content categories are held to have special significance, thus the commonest response, animals, shows lack of imagination, anatomical responses morbidity, etc.

Sen has shown by factorisation that the test contains three main components, which are termed fluency, intelligence and neuroticism. Harrower has devised a method of group examination, where blots are shown by slides and subjects write their responses on prepared forms. Eysenck has used a more reliable method in which the subjects rank each set of nine responses. This test has given small correlations with neuroticism. Burt and Sen advocate a straightforward approach owing little or nothing to abnormal psychology. They assess the strength of a number of qualities such as coherence, observation of details, verbal richness, imagination, extraversion-introversion, maturity and childishness, neuroticism.

The interpretation of projective material varies widely with the theoretical background of the psychologist. Those who follow Murray have adopted his system of needs and presses (external forces that the individual regards as beneficial or harmful), and have developed tests such as the T.A.T. (Thematic Apperception Test) to assess them.

The Pressey *XO* tests are also well known. They comprise *Form A*, for adults, which contains four sub-tests, each with twenty-five rows of five words. In the first sub-test the subject crosses out all words that are unpleasant to him, and circles the most unpleasant in each row. In the second, each set of five is preceded by a word in capitals; the subject crosses out the words associated with this stimulus and circles the most closely associated. In the third, things regarded as wrong are crossed out and circled, and in the fourth, things about which the subject has worried or felt nervous. *Form B*, for children, contains three similar sub-tests, calling for reactions of wrong, worry and like or interest respectively. Collins has adapted this and published it for British use and Bennett and Slater have included it in their *Sutton Booklet*[1]. A later edition, known as *Pressey's Interest-Attitude Test*, includes a section on personal characteristics that the testee admires.

Pressey regards the total words crossed out as a measure of 'affectivity' or richness in emotional associations. There is no confirmation of this except that scores on dislikes, worries and blameworthy actions tend to be high in neurotics and delinquents; the circled words yield a measure of 'idiosyncracy' or abnormality. Collins listed the commonest responses among 1,500 11 to 14-year-old British children and found somewhat higher idiosyncracy scores among delinquents than normal. But, like the free association measure, it fails to give appreciable and consistent correlations with other measures of emotional traits and has now dropped out of use.

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[1] The *Sutton Booklet* is now being revised and re-standardised.

The Interest-Attitude Test is more promising, since it consists of questions that boys and girls tend to answer differently according to age, and was standardised on 4,000 cases aged from 11 years upwards. It yields a measure of emotional maturity. Pressey quotes high correlations with ratings of this trait, but there seems to be no other confirmation. The scoring key shows some success in differentiating delinquent from normal children.

The best tests for use with British children are probably Jackson's "Test of Family Attitudes" and Raven's "Controlled Projection Test." The former is a soundly-constructed projection test, suitable for use with children aged 6 and upwards in this country. It consists of six black-and-white drawings which are presented to the subjects, who are asked to make up stories on them. The pictures are designed to represent fairly common situations between adults and children and to probe the following aspects of family life:

(1) the child's dependence on the mother;
(2) the child's exclusion from intimacy between the parents with a consequent threat to its security;
(3) jealousy of a sibling;
(4) transgression and the ensuing loneliness and guilt;
(5) fear of aggression from the parents;
(6) longing for the forbidden and the threat of punishment.

The instructions to the subject are, "It need not be a very good story, but it must be your own, and not something you've read in a book. You can say anything you like, anything that comes into your head. Remember, it must be a story *about* the picture. I don't want you to tell me what you can see in the picture because, of course, I can see it myself." No limit is set to the length of the stories composed by the child, but if the story becomes too diffuse the experimenter urges the child to keep to the main subject. The length of the story varies considerably with the personality and age of the child, the range of variations in length being from about 20 words by the youngest and most inhibited to as many as 310 words by the oldest and more articulate and confident.

The following account gives a typical set of responses by a 7-year-old boy suffering from compulsive movements of hands and fingers following a traumatic incident at the age of 5, when he fell into a fire and was severely burned about the hands. (Picture 4) "The man wants to kill the woman. (Why?) Because she won't give him the baby. (Why does he want it?) He wants to put it in the fire and cook it. (Why does he want to do that?) He wants to have another wife and baby; he doesn't like these." (Picture 5) "A man is coming to thrash child. He's going to put her in the fire and burn her. (Who is he?) He's her dad. (Why does he want to do that to her?) Because he doesn't like her."

Like all projective tests, this test is more suitable for the study of individual cases than for the investigation of general trends. But more generalised investigations can be carried out. For example, researches have compared the responses of delinquent, neurotic and normal children. They find that the delinquents draw a picture of a harsher family background than do the neurotics. At the same time, they seem to accept this situation with greater equanimity, or at least with less overt hostility, as if their sensibilities were less developed or already blunted. The neurotic subjects, as a group, are much less realistic in their approach to family life situations than the normal. They believe that ' naughtiness ' or ' badness ' are much more commonly met with in children than ' goodness,' and that it is likely to be punished with a severity disproportionate to its seriousness. Their jealousy of siblings is hardly moderated by a natural liking, and leads to a rejection of them, and to a fear of aggression from the older, more powerful sibling. They tend to believe that parents reject and maltreat their children more often than they like and protect them, and that children react to such treatment with hostility and rejection of the parents. This belief appears to increase their feelings of insecurity so that they are inclined to view every stranger as dangerous and are apt to react with anxiety to any ambiguous situation.

The delinquent subjects, as a group, share with the neurotics their unrealistic approach to life situations, but in some respects show themselves to be more ' conventional ' as well as more detached. Even more strongly than the neurotic subjects they tend to believe that children are ' bad ' and parents ever ready to deal out severe punishment. Similarly, they are aware of parental rejection, but are less ready to recognise and to admit that children, too, feel hostile towards and reject parents. Nor do they, as a group, show such recognition of open hostility towards and rejection of a rival sibling. On the other hand, fantasies of being ' shut out,' isolated or sent away are more common among them than among the neurotics. The delinquents are also somewhat more realistic in their attitude towards ' strangers ' or outsiders. They view them as dangerous somewhat less frequently than do the neurotics. In general, emotional interplay between neurotic subjects and their families, as reflected in their responses to the test, is more lively and intense than between delinquents and their families, although these emotions are of a predominantly negative character. Delinquents appear to be more detached, less deeply involved in the family loves and hatreds than the neurotics. This may be due to the actual feeling of ' not belonging ' as well as to a more thorough repression of both hostile and positive emotions.

Detailed knowledge of this kind is of considerable general interest to psychologists and to practising child psychologists dealing with individual children, but it cannot be said to contribute to the formal statistical approach to personality, which has the advantage of defining its terms objectively and expressing its finds quantitatively.

Another valuable projection test is Raven's " Controlled Projection Test." Kaldegg (1948) used this test to assess differences of culture pattern. She compared the response of German boys with those of English boys. She found that the German boys identified themselves with imaginary situations far more than English boys did, and took them more seriously. The English boys allowed more free play to their imagination, showed no resentment to suggestions that parents quarrelled, referred less to corporal punishment for wrong-doing, more often suggested alternatives and tended, in general, to grow more lenient as they grew older. She found German boys were more conventional in their ideas and, in their attitude to punishment, became more drastic as they grew older.

Lowenfeld has developed the Mosaic Test. The subject is given a box containing some 2 to 400 small squares, triangles and diamond-shaped pieces, coloured white, black, red, green, blue and yellow, together with a wooden tray lined with a sheet of white paper. He is told to make anything he likes with the pieces and is encouraged to go on until he is satisfied with his construction. A permanent record can be made by drawing round the pieces. A few subjects make concrete or representational patterns, but more commonly they create abstract ones which are classified into various types: compact, scattered, incoherent, also according to success of the completeness of the Gestalt, the use of edge or frame designs, arrow patterns, etc. Lowenfield and her students interpret the results largely on an intuitive basis The Mosaic Test has the advantage that it is brief and can therefore be given many times over. Thus, it is particularly useful for following personality changes during psychological treatment.

Other well-known projective tests are:

(1) Bell's Adjustment Inventory for which tentative norms (U.S.A.) are given for high school students, college students and adults of both sexes;

(2) Bellak's Children's Apperception Test, which comprises ten drawings of animals in various social situations, and is on the lines of the Murray T.A.T. on the theory that children identify more readily with animals than with human figures;

(3) Blum's “ The Blacky Pictures,” a projection test consisting of twelve black-and-white cartoons showing the adventures of a dog named Blacky, and Blacky's family;

(4) Schneidmann's “Make a Picture Story” (“Maps”), in which the examinee chooses a background, populates it with figures, and tells a story to account for his picture dramatically; the twenty-two pictorial backgrounds range from such definitely structured ones as a bedroom, a bathroom, etc., to such ambiguous ones as a vague grotto or cave-like opening;

(5) Rosenzweig's “ Picture Frustration Study,” which aims at the examination of reactions to frustrating situations, related to the extrapunitive-intrapunitive dimension.

Few of the well-known projection tests are suitable for use in schools. They are too lengthy, much too dependent on the subjective judgement of the tester, and the evidence for their validity is poor. Thus, it seems unlikely that the group Thematic Apperception or the Rorschach ink-blots test has contributed much of value to the selection of the British Army Officers or civil servants. It is essential that the Rorschach-user be an experienced psychologist fully trained in this form of testing. The amateur who uses any old set of pictures and interprets the responses largely by intuition should certainly be discouraged. These tests have a part to play in individual cases, particularly in the examination of disturbed and delinquent children, but they require too much subjective judgement and expertise to be of value to the classroom teacher.

Objective tests of personality

The difficulty of the fakability of personality questionnaires can be avoided by the use of tests which are ' objective ' in the sense that the subject is unaware of the scoring system employed, and is consequently unable to get himself a good score. Kelly has said that when the examiner is asked to guess what the subject is thinking we call it a projective test, but that when the subject is asked to guess what the examiner is thinking we call it an objective test. Such tests carried out under laboratory conditions have the additional advantage that the immediate environment can be brought under control. Many factors affecting personality reactions in everyday life in an office (say), such as deadline crises, noisy stenographers, passing salesmen breaks and singing kettles may be eliminated or manipulated. In our present early stage of development of research into the personality it is perhaps as difficult to assess human beings in the hurly-burly of social life as it would be to study falling objects by dropping them from the top of Snowdon instead of in a vacuum chamber. Certainly, investigations into the personality should be carried out inside as well as outside the psychological laboratory.

Objective tests have been extensively studied in this country at the Maudsley Hospital, under the directorship of Eysenck, and in the U.S.A. in the University of Illinois under Cattell. This is a fairly recent and rapidly-developing branch of the subject. Eysenck takes the view that, " Performance tests come nearest to the ideal of objective empirical investigations; they suffer less from the evils of voluntary distortion. Our hopes of building up a true science of personality rest on the development of this type of test more than any other." Various devices have been used to ensure objectivity. These devices are not mutually exclusive, i.e., some tests will contain several devices.

(1) *Ability Tests*

The subject may be given ability tests, such as the letter or number cancellation, simple arithmetic, or memory tests, in which the scoring is based, not on the ability to cancel, but on persistence of effort, variability and the capacity to stand up to various conditions of timing and difficulty. Or, for example, he may be asked to reproduce maturational norms, e.g., to state at what age children typically walk, disown Santa Claus, etc., in order to reveal his own attitudes to child-rearing. The subject may be asked to reproduce certain tapping rhythms which are known to be related to extraversion-introversion. He may be asked to discriminate between different specimens of handwriting, but he is scored on the *length of time* he takes to complete the test, in an attempt to measure ' criticalness ' rather than good handwriting judgements. (The actual handwriting specimens may be identical.) The subject may be assessed simply on the extent to which he obeys the test instructions in respect of numbering, spacing, etc. Or he may be asked to make up new words to describe (say) fish and chips, in one syllable, but the scores may be based on tendencies towards psychoticism rather than on neologistic facility. Or he may be asked to draw a line as slowly as possible, like a slow bicycle race, thus providing a rich opportunity for the development of doubtful practices and self-deception.

(2) *Automatic responses*

A person's handwriting and pronunciation, for instance, are so automatic that he cannot easily or consistently change them as he wishes.

(3) *Unexpected tasks*

The subject may, without having been told beforehand, be asked to remember as many items as possible that were present in a test he has previously worked, or he may be asked to name as many people as possible that he named as friends an hour before. In a controlled association test, for example, the subjects are asked to give the first word that comes into their head to a series of key words, such as 'harp,' 'red,' 'filth.' Next, the subjects have, unexpectedly, to remember as many of the key words as possible, then to complete another set of free associations, then to remember this second set of key words, and so on, the test comprising a large number of free associations followed by a memory test for the key words. The subject is thus placed in a dilemma, analogous to many that we experience in everyday life. Shall he spend his time filling in the free associations according to the test instructions or shall he concentrate on memorising the key words? His instructions are to do the former, but he is apparently being tested on his ability to do the latter. Moreover, the tester occasionally changes his mind and doesn't give a memory test at all. Questions of principle, conventionality, compromise, etc., arise, and are of considerable interest to the psychologist, whose task is to compare these scores with those obtained from other tests, questionnaires and ratings, in order to establish certain personality dimensions.

(4) *Puzzling Purpose Tests*

In these tests the subject has no previous experience to tell him whether his performance should be fast or slow or hesitant, in order to obtain high (socially desirable) marks: e.g., hidden pictures, fluency of association, owning up to common weaknesses, leg circling, sorting blocks by colour or by shape, and willingness to accept help. In the latter test the questions are very difficult, e.g., red is to green as brown is to..............?, and the subject can get some help, if he so wishes, by tearing a piece of elastoplast off his answer sheet and reading the hints provided. Whenever he avails himself of these aids, his maximum score is reduced.

(5) *Disguised Purpose Tests*

A test may be overtly concerned with measuring (say) the statement of attitudes for and against capital punishment, but be marked according to whether the subject obeys a complex set of instructions, or the marks may be based on the ratio of nouns to verbs used or the proportion of monosyllabic words or the slope of handwriting, and so on. Similarly, a circle-copying test may be marked entirely for the size of reproduction (expansiveness). (Category 1 above, 'Ability Tests,' is very similar to this group.)

D

(6) *Emotional Situation Tests*

The test situation may be so highly charged with emotion that a natural reaction is almost certain to take place. For example, the test may be very highly speeded, or very long, or much too difficult, or much too easy. The subject who shirks his responsibility in these tests and turns in unusual scores is displaying the very characteristics we wish to assess. Or the nature of the test items may lead to an emotional situation during the testing. For example, if the subject is asked, " Mary, who is a poor swimmer, sees a small child fall into a canal. Would she do best to (*a*) hurry away, (*b*) look for a lifebelt, (*c*) throw a faint, (*d*) 'phone the cops? " he is not likely to agree to any of the alternatives. Subjects differ a great deal in the length of time they potter in this situation. Or the subject might be asked to draw a circle as best he can, and be given as long as he wishes to complete the task, some people finishing in one minute and others in half-an-hour. In an investigation carried out in the University of Illinois a test of extraversion-introversion consisted of the imitation by the subject of animal noises emitted by the psychologist, the scores being the length of time before the subject began to imitate the animals, how long his imitations lasted, and so on. This is a test of extraversion, dependent for its effectiveness on an emotional test situation. In another test, the subject was wrapped in a sheet and told to raise his hand whenever he thought that the experimenter was pointing at him. " Level of Aspiration " or " Risk-Taking " tests, or tests involving distraction or shock clearly depend on the test situation itself arousing emotion. Games, as we know from experience, involve considerable emotion, and personality differences are apparent between good and bad losers, patronising and humble winners, risk-takers, bluffers, the dissociated, the talkers, the heavy breathers and the card flingers. In America we also have the gum-chewer. For example, games of poker, hare-and-hounds, shove-halfpenny, etc., can all be modified to make objective tests of personality.

(7) *Emotional Content Tests*

Some tests derive their objectivity from the fact that the subject is shaken out of his reserve and responds naturally owing to the emotional content of the items. In some tests, people's emotions are directly aroused by the nature of the material, e.g., value systems, or political or religious beliefs. Other material may be disgusting, immoral, or humorous, or music may be used to arouse emotion. For example, the subject may be asked about annoying things, such as ' burpers ' or ' car honkers,' or about disgusting things, e.g., snotty noses, or about humorous reactions, or frightening things, such as the effect on memory of photographs of motor car accidents that are forbidden for public reproduction and are normally available only to the police and medical authorities. The subject may be asked unwarranted confidential information about his private affairs, e.g., " How faithful do you consider your father was to your mother? " He may be provided with a long form inviting criticisms of the tests and of the administrators. These tests may all be scored for timing, perseverance and variability, etc., as well as for the content of the answers.

(8) *Physical and Physiological Tests*

Bodily dimensions, such as height/cube root, or weight, or physiological measures, such as blood pressure, pulse rate, psychogalvanic response, belong to this category.

Not all of the so-called objective tests are strictly objective in the sense of being unfakable. This depends on the technique used for attaining objectivity. Tests designated 'ability tests,' 'disguised purpose,' 'unexpected task,' 'puzzling purpose,' 'emotional test situation,' and physical and physiological measures cannot be faked. Automatic tasks can perhaps be slightly improved, e.g., in such habits as speaking clearly. On the other hand, the wide variety of tests based on 'emotional content' can obviously be faked. This includes such tests as opinionnaires, inventories, likes and dislikes, virtues and vices, annoyances, emotional recall, life goals, prying questions, reading preferences, swear words and bohemian tastes.

Moreover, subjectivity is introduced into some personality tests, not by the subjects, but by the scorers and test designers mainly because of:

(1) subjective perceptual judgement by the scorer; this enters into such tests as mazes (where the scorer has to judge whether the line drawn by the subject touches the edge of the pathway), 'shove-halfpenny' (whether the coin is completely within a division of the board), number of words read correctly in an individual reading test (did the subject really say 'intrigue' or not?), and so on;

(2) subjective intellectual judgement by the scorer, e.g., in judging whether objects seen in the picture are threatening or not, in whether answers not included in the key are facetious or not, in counting the number of qualifying phrases in a test on the effect of horrifying pictures or attitudes;

(3) subjective intellectual judgement by the test constructor when drawing up the key for such items as 'highbrow *versus* lowbrow tastes,' or 'aesthetic' shapes, or 'bohemian' names for houses, cars, etc.

Yates and Pidgeon are doubtful whether objective tests of personality are ever likely to be practicable for widespread application. They point out that even the measurement of a single trait at a satisfactory level of reliability would involve the employment of a number of lengthy tests, probably mainly individual. Thus, if additional consideration is to be given to personality factors, it would probably best be tackled as part of the procedure for dealing with border-zone pupils. There is no particular reason, except conservatism, why certain objective personality tests should not be administered and scored by teachers in the same way that group intelligence tests are now administered and there would be the same need for adequate training in interpretation of the results. No doubt such use (hedged in with provisos and caveats) will take place in the United States before it takes place in Britain (just as the Americans will be walking about on the moon while we are still gazing into the waters of the Cam), but since the knowledge gained from such tests will help us, in some measure, to understand human development and behaviour, we may be certain of their eventual use in education. It is not suggested, however, that this stage has yet been reached, or that it will be attained without a great deal more research and practical experience.

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Research Note:

SCHOOL DIFFERENTIATION AND THE SOCIAL ADJUSTMENT OF THE PUPILS

by INGVAR JOHANNESSON

A Summary of Research for the Swedish Parliamentary School Committee

Design

A STUDY of pupils' social adjustment cannot be concentrated merely on an investigation of facets of their individual behaviour, such as social values, attitudes and interests. In order to have a clear picture of their social attitudes we have to analyse the entire process of interactions between the individual and a number of influential factors in the environment. As a basis for this type of *analysis of interaction* we have drawn the following design (Fig. 1).

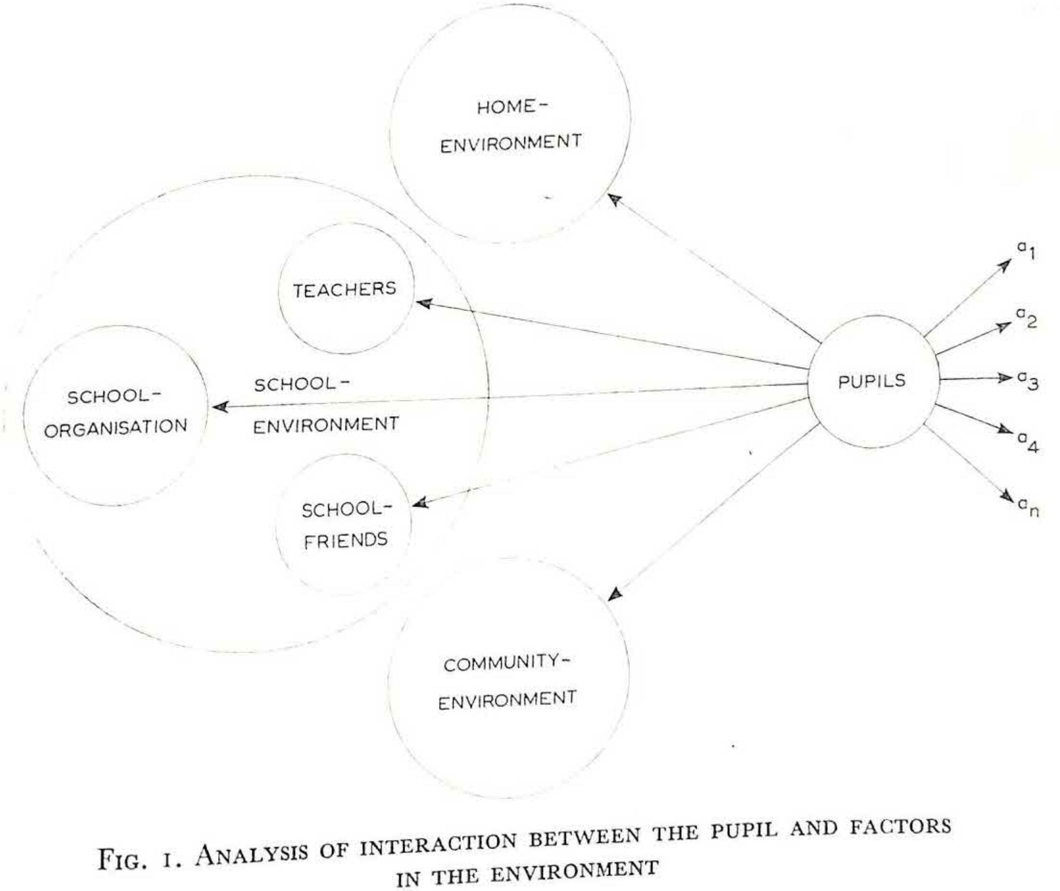

FIG. 1. ANALYSIS OF INTERACTION BETWEEN THE PUPIL AND FACTORS IN THE ENVIRONMENT

From the great number of influential factors, we have chosen those factors of environment which we assume to be most active in the development of the individual's social attitudes. *The groups of friends* and the behaviour and values of these groups play an important role during youth for the individual's social development. *The school teachers* and their opinions of educational and disciplinary problems are of great importance for the pupils' attitudes and feelings. *The home-environment*, the parents' ambitions and interests, their own education, and their own experiences from school as well as the *community-environment*—all these things contribute to the development of the pupils' interests, attitudes and other patterns of social behaviour.

We are going to relate these four groups of background factors to differences in the way the school is organised. These differences of school organisation are those found in practice; no experimental changes were made in the organisation or composition of the classes to be studied.

In most of the Swedish school districts a differentiation between the pupils is made after the sixth form (age 13+). Pupils with high enough marks are placed in the secondary academic schools (realskolor and flickskolor). Pupils who have not high enough marks for these types of school are placed in the seventh form of the basic school (folkskolan klass 7).

In 1949, a comprehensive school (enhetsskola) with nine grades was introduced, in which all pupils of each district are kept together in a compulsory school for nine years. These three types of school (realskola, folkskola and enhetsskola) represent, therefore, three different educational types of environment of differentiation, and they are the main factors to be studied.

The pupils' social attitudes, marked $a_1, a_2 \ldots\ldots\ldots a_n$, in the diagram may thus be studied in relation to three separate types of school organisation.

In an ideal experimental situation all other variables would be kept constant. This, however, was not possible. However, these *background variables* (different types of environmental influence) have been systematically varied so that their partial influences may be estimated. Similarly, results will depend upon the pupils' individual traits (individual variables), for example, their intelligence and their personal characteristics. These variables also we have tried to control.

Instruments

The pupils' social attitudes were studied by *sociometric methods* and *attitude tests.*

The sociometric choices were based upon direct questions to the pupils concerning their social relations, and the method enabled us to study the social interactions in the classes.

The pupils were asked to mark their choices in a questionnaire with the following five categories of choices. These five categories can be considered as a five-point scale. Each participant was asked to mark every other pupil of his class in the questionnaire in response to three questions, the first concerning choice of fellows for an *athletic group*, the second, choice of members in a *working group* in the classroom, and the third, selection of companions for *going to the pictures*.

In reply to a question on the above lines, the form of response was:

Pupil's name	1 Above all	2 Willingly	3 Indifferent	4 Not willingly	5 Not at all
A					
B					
C					
D					
.					
.					
.					

The pupils' attitudes were investigated by two attitude tests to obtain information about their general attitudes and readiness of action. One of these tests, called 'Our Class' (Vår Klass), was a 'Likert scale' and contained 92 items about various school problems, e.g., the pupils' ideas of the teacher's educational intentions, his treatment of the pupils, the pupils' attitudes towards their friends, their behaviour and their adjustment to the school situation.

In the treatment of the results, the items were divided into three groups in terms of their type and content. One group consisted of *attitudes towards teachers*, the next concerned *attitudes towards classmates*, and the third dealt with attitudes *towards the school situation.* By computing the correlation coefficients between the items in each group it has been possible to obtain relatively homogeneous attitude scales.

The second attitude test consisted of paired comparisons. By this method we tried to analyse the pupils' views *on the length of the school-day*, *homework*, *the teacher's behaviour*, *friendly relations, and results in examinations*.

These five areas of comparison were framed in a positive and in a negative way; then each was compared, pair-by-pair, with the others. In this way ten positive and ten negative pairs of comparisons were obtained.

To check on and control certain individual variables, personality tests and intelligence tests were also used. The personality test is a revised and short group-test version of the M.M.P.I.

Finally, the teachers' attitudes to educational and disciplinary problems were investigated by a scale of the 'Likert type'. The parents' attitudes to school problems were also examined by a questionnaire with direct questions.

Population

In order to control certain important environmental factors, school districts were chosen so that they were pairs, or triplets, in terms of their geographic and demographic structure.

Four such groups of school districts were situated in:

1. Skåne.
2. Stockholm.
3. Västmanland.
4. Norrland.

The number of classes was 114; 24 were drawn from well-established comprehensive schools; 40 classes came from a more recently established comprehensive school; 33 classes from secondary academic schools, and 17 classes from elementary schools.

After some consideration the seventh form was chosen for our investigation, because this is the first class of the secondary school, the system of class teachers is replaced by a system of teachers specialising in certain subjects, and a differentiation of the pupils is made.

Pupils of this age are at the beginning of puberty and their behaviour is characterised by restlessness, negativism and other problems. It is, therefore, very important to investigate the degree of their difficulty of adjustment in various types of school. A follow-up study of these problems would, of course, be very desirable but it has not been possible in this context.

Problems

The problems chosen for study in this analysis of the data are as follows:

1. How do pupils' relations to friends appear and develop under different methods of differentiation?
2. How do the pupils' relations to teachers and to school situations appear and develop under different methods of differentiation?
3. What is the importance of the pupils' level of intellectual capacity for the development of their social views?
4. What is the importance of the pupils' personality development for their social attitudes?

5. What part does the number of pupils in the class play in the pupils' interactions and attitudes?
6. How does the community background affect the pupils' attitudes?
7. What effects have the teachers' attitudes and the parents' interests on the pupils' attitudes towards the teacher and the school situation?

Results

1. *The pupils' relations to friends*

Our results show that there are certain differences between the school types, regarding the sociometric variables as well as the pupils' attitudes to their friends. The most important differences are to be found between the pupils of the elementary school and those from the secondary academic school.

A class where the pupils give each other a great number of positive sociometric choices is considered to be more integrated than one where the pupils give each other negative choices.

Regarding the sociometric choices, higher means and more positive tendencies are to be found in the elementary school than in the secondary academic school. The results of the comprehensive school are more similar to those of the elementary school than to those of the secondary academic school.

However, investigation of pupils' attitudes towards their friends suggests that the most positive values are to be found in the secondary grammar school. The most negative attitudes towards friends are to be found among the pupils of the elementary school.

2. *The pupils' relations to teachers and the school situation*

Elementary school pupils differ by being more positive in their attitudes towards their teachers. In all types of school there is tendency for the pupils' estimation of their teachers to decline.

The pupils' attitudes to school situations show, in the positive scale, somewhat better results in the secondary grammar schools and the elementary schools than in the comprehensive schools. However, the greatest differences between the school types are to be found in the secondary grammar schools in their less negative attitudes to school and school situations.

3. *The pupils' social relations and intellectual capacities*

Even when pupils are grouped according to their level of intelligence pupils from the elementary and comprehensive schools have more positive ratings in their sociometric choices of their own sex than the pupils of secondary academic schools.

For all types of school it is evident that pupils of the highest intellectual level obtain more positive sociometric ratings than those of a lower intellectual level, from the opposite as well as from their own sex.

Among the pupils of the highest intellectual level very high scale values are obtained in their attitudes to friends and to the school situation.

4. *The pupils' attitudes and level of personality development*

The pupils were grouped into three levels for personality development: an upper level with predominantly harmonious development of personality and good social relations; a middle level with an average development; and finally a lower level showing symptoms of maladjustment.

The greatest differences in the pupils' *sociometric choices* are to be found, at all three levels, between pupils of the secondary grammar schools and those of the elementary and comprehensive schools. Pupils in the highest personality group are considerably more positive in their choices.

In attitudes, it is evident that the pupils of the highest level are more positive to teachers, friends and the whole school situation.

5. *The pupils' attitude and size of the class*

In small classes *the sociometric* choices generally show higher means, probably because in such classes a more intimate interaction among the pupils goes on, and positive relations are favoured.

As far as attitudes to teachers, friends, and the whole school situation are concerned the number of pupils in the class seems to have little importance.

6. *The attitudes of pupils from different geographic regions*

In the sociometric and in the attitude variables, the greatest differences are to be found when comparing the results from different geographical regions. In all variables, the rural groups of Skåne, Västmanland, and Norrland generally have the highest values. The Stockholm group has in all cases the lowest values. Thus the most important differences in the pupils' social behaviour seem to depend upon circumstances outside the school situation. The general community background is of great importance both for interactions among the pupils and for the pupils' attitudes to teachers, friends and the school situation on the whole.

7. *The pupils' attitudes to teacher and parental attitudes*

The teachers' views on educational problems seem to be linked to their own education and their work conditions. Elementary school teachers are found to be more dominant in their attitudes than academic teachers. Moreover, elementary school teachers teaching in elementary schools are more dominant than those teaching in other types of school. The correlations between the teachers' attitudes and the pupils' attitudes towards teachers are generally low and below the level of statistical significance, except for those between girls and their teachers.

The questionnaires regarding the parents' attitudes to the pupils' education and their vocational guidance show great differences between the comprehensive schools on the one hand, and the secondary grammar schools and the elementary schools on the other. In the comprehensive schools the parents are more active at teacher-parent meetings, discussing vocational guidance and other problems.

The relationships between the parents' attitudes and the pupils' attitudes are quite significant. The parents' keen interest in the pupils' school work and high ambitions for their further education, influence the pupils' attitudes in a positive direction.

Conclusions

Our investigations indicate that the elementary school, as an educational environment, has certain factors favouring social interaction among the pupils. The most important of these are the factors of acquaintanceship and the size of the class. In a class that remains unchanged for several years, the pupils become very familiar with each other and a strong feeling of kinship is developed. These feelings disappear when the class is divided. It is evident that the pupils have a limited number of intimate friends and their selection is relatively independent of the size of the class. The possibilities of social contact are reduced in proportion to the increasing number of pupils in the class: small classes, on the contrary, increase the possibilities of more intimate social contacts.

The negative attitudes shown by pupils in the elementary schools, both to friends and to the whole school situation, are probably caused by the selective process that brings the more intelligent pupils to the secondary academic school. Conversely, the positive attitudes of secondary academic school pupils to the school situation seem also to depend upon the selective process. This attitude seems to result from their expectations of a new school to which, after much competition, they have gained entrance.

The relations between the environmental variables (school organisations, home conditions and the community background) and of individual variables (intellectual capacity, development of personality) in relation to the pupils' attitudes are complicated. It has not been possible to decide which factors are most important in this course of development. All results are probably influenced by the individual's special traits (differences in intelligence and differences of personality) and the pupils' attitudes are under the influence of the parents' interests and ambitions.

Furthermore, the general community background plays an important rôle both for the pupils' interactions and their attitudes. The metropolitan environment seems to be an obstacle to more intimate interactions among the pupils and complicates the forming of positive attitudes.

Research Note:

THE ATTITUDE OF PART-TIME DAY RELEASE STUDENTS

by R. Ann Abel

As it is important to ascertain the attitudes of the students who attend part-time day release classes, a small survey was carried out in two colleges of further education.

This is a small-scale enquiry and inevitably suffers from the fact that its samples are not fully representative of part-time day release students in general. The three different kinds of students (all male) were:

(*a*) Government trainee employees between the ages of 16 and 17, one-third of whom had been at the college for under six months, the remainder for up to eighteen months. They were sent to the college for general educational purposes, but special courses were arranged for them to cater for their specific interests, and although their employers suggested that they did these, the only compulsory subject was Physical Education. Those students who wanted to follow G.C.E. courses were encouraged to do so.

(*b*) Young postmen whose average age was about 16, over a third of whom had been at the college for under six months, the same number for between six to eighteen months, and the others for a longer period. They were also sent to the college for general education and the subjects studied included English, Mathematics, Geography, Social Studies, Physical Education and a choice of a craft, such as Metalwork, Woodwork, Art, etc. As most of these students were engaged in employment necessitating cycling, arrangements were made on an experimental basis for them to attend courses in Road Safety which would link up with their basic subjects.

(*c*) Apprentices following technical courses, the majority following a City and Guilds' course, the remainder a National Certificate course. Their ages were between 15 and 17 and the greater number had been in college for a year. Their employers included both large and small firms and their jobs included motor mechanics, plumbing, gas fitting and welding, etc.

The numbers in the respective groups were as follows:
(*a*) 33, (*b*) 64, (*c*) 64, not all students answered every question. The writer has taught some students of all types concerned in the enquiry. The classes were chosen at random.

Let us first consider the background of these students. 42% and 18% of the young postmen and technical students respectively found their jobs through the youth employment officer. The influence of friends accounted for 11% and 21% of these placements respectively. 23% of the technical students obtained their jobs through their families, while the parental influence was less in the case of the young postmen. No information on this topic was available for the first group.

Nearly half the government trainee employees had attended grammar schools, and the answers of these and the non-grammar school pupils have been analysed separately. Most of the other two groups had attended secondary modern schools.

The young postmen were significantly older than the technical students though the latter group had been significantly longer at college ($P = 0.05$). There was no significant difference in the scores of the Raven's Matrices between these two groups. The government trainee employees' results were not included as they did not permit a fair comparison.

In answering the question, " Do you belong to the local library? " no difference between the three groups was found.

As the technical students were encouraged by the college to attend evening classes, statistically it was shown that more in fact did so. Considerably more non-grammar school government trainee employees attended evening classes than their ex-grammar school peers.

On being asked what they most enjoyed doing at college 73% of the government trainee employees, 59% of the young postmen and 60% of the technical students stated specific subjects. (See Table I.)

Table I

" What do you most enjoy doing at College? "

	GOVERNMENT TRAINEES			YOUNG POSTMEN %	TECHNICAL STUDENTS %
	(Non-Grammar) %	(Grammar) %	Whole Group %		
Mathematics	—	—	—	5	8
English	8	—	3	2	16
Science	—	—	—	4	13
Other subjects	31	25	28	12	4
Practical subjects	8	6	7	25	13
Sport	38	31	35	12	6
Dancing (female company)	—	—	—	9	12
Other	—	19	10	—	6
Going home	15	19	17	31	22

It is of interest to note that 16% of the technical students put down English, 13% Science, and the same number practical work, whereas nearly double the number of young postmen stated the latter subject. Others mentioned that they liked the social side, 9% of the young postmen and 12% of the technical students. No reference was made to this aspect of their day by the government trainee employees. Over 20% of all the students, however, did not seem to enjoy coming to college. (See Table II.)

Table II

" What do you least enjoy doing at College? "

	Government Trainees			Young Postmen	Technical Students
	(Non-Grammar) %	(Grammar) %	Whole Group %	%	%
Mathematics	7	—	2	25	30
English	—	—	—	25	13
Science	—	—	—	—	13
Other subjects	36	30	33	10	9
Practical subjects	—	4	2	—	9
Sport	—	—	—	5	—
Other	50	12	25	10	—
Nothing	—	12	8	2	1
Coming: working	7	42	30	23	25

It should be realised that many of these boys were not interested in furthering their education, and regarded the time spent at the college as " a break from work."

There was a significant relationship between the type of students and what they most enjoyed doing at college and a similar statistical result was obtained from the answers to the question, " What do you least enjoy doing? " ($P = 0.01$). Mathematics was given as an answer by the largest number in both these groups to the question, " What was least enjoyed? "; with the government trainee employees there was no one predominant subject. The next subject given which was least enjoyed was English by the young postmen and Science by the technical students. It is of interest, however, to note that in answer to the question, " Which of the subjects you study will be of use to you in your job? " the majority of the young postmen answered Geography and the majority of technical students answered Mathematics, the second and third subjects being Mathematics and English for the former and Science for the latter. (Table III).

Table III

" Which of the subjects you study will be of use to you in your job? "

	Maths. %	English %	Geography %	Science %	Technical Drawing %	Physical Education %	Social Studies %
Young Postmen	31	28	39	Not taken	Not taken	1	1
Technical Students	36	9	Not taken	31	24	Not taken	—

A large number of students found most useful those subjects which they disliked most.

It has to be realised that the apparent attitude to a subject may not reflect the real attitude but indicate the attitude to the teacher of the subject or to his method of teaching.

What did these part-timers consider as being " the best way to interest the student in a subject? " The following methods were suggested:

- to make the subject interesting;
- to make the student interested;
- to do practical work;
- to have variety in the lessons;
- to take an interest in the student;
- to show films and illustrate the lesson;
- for the teacher to be interested in the subject and know the facts;
- to allow the student to work on his own and take an active part in choosing his own subject;

Table IV gives an indication of the strength of their opinions.

Table IV

" The best way to interest a student in a subject is . . . "

	GOVERNMENT TRAINEES			YOUNG POSTMEN %	TECHNICAL STUDENTS %
	(Non-Grammar) %	(Grammar) %	Whole Group %		
To make the student interested . .	—	—	—	4	10
To make the subject interesting	14	5	9	6	8
To do practical work	14	5	9	6	17
To teach well, and explain clearly	23	32	28	25	11
To have variety in the lessons . .	—	5	3	—	8
To have a friendly teacher	7	5	6	8	4
To take an interest in the student	—	—	—	8	—
To show films and illustrate the lesson . .	7	16	12	4	4
For the teacher to be interested in the subject and know the facts . .	7	5	6	4	—
To allow the student to work on his own, and take an active part in choosing his own subject	7	16	12	8	2
Others	14	11	12	6	21
Blanks (not filled in)	7	—	3	21	15

Under the heading " Others " in the Table were included such comments as: " if subject is sport, " " not to give orders, " " lets students watch television, " " to be friendly, " " not to work them hard, " " to have chemistry and more of it, " " to offer fags around. " It is interesting to note that to do practical work was of most interest to technical students (17%), whereas by the young postmen and government trainee employees " good explanations " were considered to be the most important.

There is no significant association between the kind of student and type of answer given, and a similar result has been obtained from the answers to the question, " A good teacher is someone who . . . . " Although the comments overlap with the previous question, as Table V shows, over 40% in all groups stated that " a good teacher is someone who understands, has patience and keeps discipline."

Table V

" A good teacher is someone who . . . "

	GOVERNMENT TRAINEES			YOUNG POSTMEN	TECHNICAL STUDENTS
	(Non-Grammar) %	(Grammar) %	Whole Group %	%	%
Makes the lesson interesting	7	—	3	2	6
Understands, has patience, keeps discipline	43	42	43	59	46
Makes students interested	7	10	9	6	10
Explains well	22	16	18	2	13
Knows what he is doing, interested in the subject	14	16	15	8	—
Others	7	16	12	13	13
Blanks	—	—	—	10	12

Statements under "Others" in this Table include "someone who is willing to discuss with his pupils," " who lets you have your own opinion," " who is young," " who can get a class to talk," and " lets you have your own way." Moreover replies to questions of this type are liable to be affected by a variety of attitudes in the group—bravado, unwillingness to commit oneself, a facetious defence against what is seen as a resented intrusion, and the like. Nevertheless expressed attitudes have to be reckoned with. A more ambitious study involving an attempt to assess attitudes and their change at different points in the course is at present being undertaken with a sample of technical students.

The fact that so many of these young students appear apathetic towards participating in further education is supported by the answer to the question, " When I started work I did not expect . . . . "; 21% of government trainees, 17% of the young postmen and 28% of the technical students wrote " to come to school." It seems that when the youngsters left their day schools, they neither planned to continue their education afterwards nor did they realise they would have to undertake further education when they commenced employment. It is no wonder that some of the student population are not very enthusiastic about attending, especially if in some cases they are just told to report to " such and such a college " without being given further details. One student, who is by no means an exception, commenced work in July and did not know anything at all about attending college until the middle of September when he was told to register at a certain college.

Although many heads of secondary schools strongly recommend their school-leavers to continue their education on a part-time basis and even only to accept jobs where day release is given, or to ask for it if it is not, this is not the general rule at the moment.

Other answers to this question, "When I started work . . . . " indicate that these young workers were unaware of such elementary facts as conditions of work, pay and type of employment. This is illustrated by such answers as " hard work, low pay," " having to work on Saturdays," " shift work," " so much clerical work," " to be a piece worker." In this connection it is understood that information about their conditions of work, etc., is in fact given to them when they first attend at their place of employment.

Each student was asked to write a letter to a friend describing his normal working week, including the time spent at the college. The aim of this was to find out their opinion on attending college without asking them directly. There is a significant association between the type of student and type of reference made about this point. Their replies were most informative. Although in some letters no mention at all was made of their day spent at the college and in others it was just stated that they attended, without indicating whether they had a positive or negative attitude about attending, the majority did express themselves in such a way as to indicate their feelings. Very few of the government trainee employees were without an opinion. The numbers expressing a positive attitude is what is expected by chance, but more than expected considered it a waste of time. Among the young postmen the distribution is what would be expected, except that slightly more said they disliked it. More of the technical students than expected had no opinion and fewer negative attitudes were expressed.

Some in each of the groups were extremely enthusiastic about coming to college as it helped them in their work. One student replied, " I have learned more in one year than five years in school; most blokes don't like coming, but I wouldn't miss it, given the chance." Another stated that it was, " the most profitable day of the week " and that, " I can now take subjects I wanted to study at school but which couldn't be fitted in." Some other aspects mentioned were " learning more about the world and the wonderful things it offers you," " freer than ordinary school." On the other hand, negative comments included the following: " We are worked to death," " the worst part of the job is to have to attend college, I think I have had enough education," " I do not like the boredom of being reminded of school days."

The students were asked to rank nine different ways in which the lesson time could be usefully spent. When tested statistically the results of each group showed a very high degree of agreement. When the overall ranks for each group were considered the same level of agreement was shown. Thus the reference order for the combined group was obtained and is as follows:

1. to go on an educational visit;
2. to watch film strips;
3. to have a discussion;
4. to hear a talk from the teacher;
5. to do something practical;
6. to look up facts on a certain subject;
7. to work out a problem;
8. to write an essay;
9. to give a talk.

The fact that " to go on an educational visit " was the first choice of all the students in indicating how lesson time could be most usefully spent shows that they are interested in seeing new places, and having new experiences. It is not unexpected that watching film-strips is high on the list, but it is interesting that " to have a discussion " comes next. So often in the day release course there is insufficient time for the student to air his views informally, and this is not always realised.

The three last items on the list are not unexpected: to work out a problem, to write an essay, and to give a talk. Many who have taught day release students are aware how unwilling some of these youngsters are to be made to think and to put pen to paper. If a student is asked to give a talk, no matter how familiar he is with the subject, the very fact that he has to stand up in front of the class, at this self-conscious stage of his development very often results in all the words completely disappearing from his head. It is therefore small wonder that he claims that, in his opinion, " to give a talk " is the way a lesson can be least usefully spent. With this method, however, very much depends on the teacher's approach.

Although this enquiry has been carried out on a very small scale and only touches on a few of the aspects of the part-time day release student's day at college, it is hoped that it does give some indication of attitudes towards this type of education.

A further series of cautions is necessary in considering this or any similar piece of work. Replies to questionnaires necessarily reflect the experience of those who answer them; and subject names such as English, Arithmetic, etc., may mean fundamentally different things in different schools or colleges. Hence we may interpret the findings of this small enquiry—which are very similar, be it said, to others carried out since the war—as a reflection of the kinds of attitude to be found in adolescent groups of this type and based upon their perhaps not very fortunate earlier experiences. As such they do something to define the challenge presented to the teacher who believes or knows that particular facts, modes of thought and educational skills are necessary to his students.

Postscript

Did the students alter their outlook appreciably over a period of two years?

Six of the students involved in the study described above were found to be part of the project mentioned on page 144. Despite the smallness of the number they were asked to complete the same questionnaire to find out if any changes had taken place.

The two sets of replies were compared. In every case interest in at least one of the hobbies originally mentioned remained and has developed further, e.g., painting has now become decorating.

Subject preferences have not altered greatly; nor have replies to the question, "When I started work I did not expect . . . ."

Consistency is seen in the ranking of the nine different ways in which the lesson time could be most usefully spent.

Replies to the other questions show a more mature outlook indicated by a greater expressed liking for subjects of use at work.

In answers to the question, " What is it you most enjoy doing at college ? " the earlier emphasis on the recreational aspects has been replaced by specific academic subjects.

Suggestions as to the best way to interest students in a subject changed from those of a somewhat frivolous nature to more serious and realistic ones. In the earlier replies the descriptions of a good teacher stressed personal characteristics, such as pleasantness and calmness; in the later replies these have given way to emphasis on actual teaching method and class control.

This information is based on too few cases for statistical treatment. It does, however, suggest that those students, in the two years that have elapsed, have developed a more serious and mature approach to part-time day release education.

THE CURRICULUM OF JUNIOR SCHOOLS

A Select Bibliography with Additional References to Remedial Teaching of the Basic Skills

by D. A. Rigg

THE following selected bibliography is designed to help teachers who require readily available help in planning work with juniors throughout the whole range of activities in school. Since there are not always specialists in music, art, drama and physical education among the teachers in junior schools it may be useful to study approaches and methods which other teachers have found to be successful and the ways in which problems common to all have been solved.

Care has been taken to include works dealing with the teacher's understanding of the educational value of the subjects taught as well as with practical classroom organisation and methods. In addition, the aim has been to include titles which are generally available in Public Libraries and in the County Libraries of L.E.A.s.

Among the sources of items in this bibliography the following are particularly useful:

1. **Educational Book Guide** compiled by the National Book League. Councils and Education Press. (Vol. 1, 1956; Vol. 2, 1957; Vol. 3, 1958; Vol. 4, 1959; Vol. 5, 1960; Vol. 6, 1961.)
2. **Library Catalogue.** The National Union of Teachers. July, 1959.
3. **Basic Requirements of the Junior School.** U.L.P., 1951.
4. **Froebel Foundation Library Catalogue and Supplement.** (N.F.F., 2 Manchester Square, London, W.1.)

GENERAL WORKS

Report of the Consultative Committee on the Primary School. Board of Education. H.M.S.O., 1931.

Frequent reference to the above report is made in the recent Ministry of Education book, *Primary Education*, demonstrating repeatedly the foresight which inspired it, and it is interesting to note how many of its suggestions are only recently being tried in some schools. As an example of this 'modern' outlook one may quote the statement (p. xxi) that "subjects are not independent entities, but divisions within the general field of knowledge, whose boundaries move, and should move, backwards and forwards."

The report also contains (Ch. 1) a concise account of the development of primary education from the beginning of the nineteenth century until 1931.

A study of the chapter on mental development will need to be supplemented by reading on recent advances in child study and in the social psychology of education.

The Primary School in Scotland. H.M.S.O., 1950.

Contains many useful chapters on the curriculum of junior schools, and in particular one may mention Chapter 5 (Method), Chapter 6 (Projects), and Chapter 11 (Spoken English).

Primary Education. H.M.S.O., 1959.

Whilst incorporating suggestions for the work of primary schools made in the earlier Report, this book embodies the results of much careful thought about the ideas and practices which seem most worthy of consideration by teachers at the present time. In compiling this book Her Majesty's Inspectors have drawn on their experience in a wide variety of schools and upon their discussions with teachers about the principles on which they act and the standards they achieve.

The Curriculum of the Junior School. N.U.T. Consultative Committee. Schoolmaster Publishing Co., 1958.

A complementary volume to *Primary Education* covering the same field but based on the research of a panel including junior school head and assistant teachers with representatives from training colleges. Its concern is with juniors only and it includes two separate sections not treated in the above volume on Primary Education—School Buildings (Ch. 5), and The Supply and Training of Teachers (Ch. 6).

Activity in the Primary School. M. V. Daniel. Blackwell, 1953.

A well-illustrated book giving practical guidance in organising active learning in all aspects of primary school work.

The Junior School Today. B. Ash and B. Rapaport. N.F.F., 1958.

Creative Work in the Junior School. B. Ash and B. Rapaport. Methuen, 1957.

Skills in the Junior School. B. Ash and B. Rapaport. Methuen, 1960.

These three books by two lecturers in Education at the Froebel Educational Institute describe how the principles of Froebelian education are being carried out in practice. Teachers will find an excellent chapter on work based on children's interests in Chapter 9 of *Creative Work in the Junior School*, whilst Chapter 7 of *Skills in the Junior School* describes the evaluation by children of their own work and deals with methods teachers may use to record individual progress. The final chapter is full of sound advice to young teachers in their first year of full-time teaching.

Psychological Foundations of the Curriculum. W. C. Olson. U.N.E.S.C.O., 1956.

Contains brief accounts of the results of recent studies in child development with useful summaries of learning theory, growth theory, theories of play, and selected research findings in the subject fields of the curriculum.

Syllabuses and Schemes of Work.

In addition to references contained in the general works quoted already there are syllabuses and time-tables for junior schools in the following:

The Junior School: Schemes of Work and Organisation. Evans, 1956.

Common Sense in the Primary School. J. C. Gagg. Evans, 1951.

Junior School Community. M. Atkinson. Longmans, 1949.

TEACHING THE BASIC SKILLS

(a) Written and Spoken English

Language: Some suggestions for teachers of English and others. H.M.S.O., 1954.

One of the most stimulating discussions on the function of language, on methods of teaching spoken and written English, and on the teaching of reading available at a very reasonable price. Chapter 5 deals with English in Primary Schools, and there is, in the appendix, an examination of the use of phonic training in reading by Mr. John Duncan.

The Language and Mental Development of Children. A. F. Watts. Harrap, 1944.

This is probably the most valuable and interesting book on the subject available, and no teacher could fail to profit by a study of Chapter 1 which explains the function of language (p. 17), the connection between language and thought (p. 20-21), and the difference between creative and reproductive thought.

The author's experimental work has furnished evidence of the correlation between language and general intelligence, and the results of his studies of children's vocabularies are quoted in the large section devoted to test material.

Appendix 2 (pp. 267-341) reproduces the following tests which are available separately: 100 common names, common class names, common verbs, common adjectives (Lists A and B).

(b) The Teaching of Reading

Since most teachers of juniors relate the teaching of reading to work in oral English, creative written work, and topic work or projects references are confined to works not listed elsewhere.

Reading Ability. H.M.S.O., 1950.

Standards of Reading, 1948-56. H.M.S.O., 1957.

These two publications are concerned with two surveys of reading ability instigated by the Ministry of Education. Chapter IV in *Standards of Reading* will be interesting for its description of the reading experience of children in a variety of home and school settings.

Young Children Learning to Read. University of Bristol Institute of Education, Publication No. 7. U.L.P., 1955.

The aim of this short book is to survey current methods of teaching reading and to suggest effective methods and organisation during the early stages of reading.

The Improvement of Reading Ability. L. B. BIRCH. British Journal of Educational Psychology, Volume XX, p. 73. June, 1950.

An account of an experimental survey of reading ability carried out with 9, 10 and 11-year-old children in Burton-on-Trent in 1947 and again in 1949 in order to assess the improvement effected in reading ability as the result of a planned programme of remedial education.

The Psychology and Teaching of Reading. F. J. SCHONELL. Oliver and Boyd, 1951. New Edition, 1960.

A clear account of the psychological factors which influence reading ability with practical suggestions for teaching and testing. Reference is made to the author's *Happy Venture* readers.

(c) Arithmetic

(see also the section on remedial teaching)

Arithmetic in Action. E. BRIDEOAKE AND I. D. GROVE. U.L.P., 1939.

The authors of this well-illustrated book have planned to bring into the classroom some of the number activities on which young juniors may base their understanding of permanent mathematical principles.

The apparatus described and the games suggested will be eminently suitable for young juniors as they progress through a series of experiences of weight, length, capacity, fractions and money exercises.

Building Up Mathematics. Z. P. DIENES. Hutchinson Educational, 1960.

In this relatively short book the author, who is a lecturer in Mathematics in the University of Leicester, explains how a re-examination of the way children learn Mathematics may help teachers to provide learning experiences which are right for their stage of development.

The author illustrates the use of the Multibase Arithmetic Blocks (M.A.B.) on pages 55-74 to promote creative constructive work out of which later logical and analytical understanding may grow.

Chapter 4 discusses the formation of algebraic concepts as a natural part of the mathematical experience of children. There are numerous photographs and explanatory diagrams.

The Creative Use of Mathematics in the Junior School. L. G. W. SEALEY. Blackwell, 1960.

Readers of this book will soon discover that in addition to considering the organisation of mathematical experience in the Junior School they are led into many absorbing discussions of the ways in which children learn to understand mathematical ideas as they become aware of the mathematical possibilities of their environment.

Throughout the book the quality of children's learning is stressed, whilst many practical ways of using apparatus and materials are listed in a full appendix (pp. 98-103).

Workbooks: F (Facts to discover and learn)
U (Finding Mathematics around us)
C (Learning and Using some important mathematical ideas)

are available from the same publishers for class use.

The Teaching of Mathematics in Primary Schools. A REPORT OF THE MATHEMATICS ASSOCIATION. G. Bell, 1956.

This Report, published by the Mathematics Association, is a useful guide to teachers who wish to relate their teaching not only to the interests of children but also to the psychological processes which govern their learning.

There are valuable suggestions about the use of simple apparatus in Chapter 6 (Material Aids to Teaching), and Chapter 7 (Research on the Teaching of Arithmetic) contains in concise form a summary of recent research indispensable to those wishing to review critically their established practice.

The Teaching of Arithmetic in Primary Schools. L. W. DOWNES AND D. PALING. O.U.P., 1958.

The authors of this excellent book, commissioned by U.N.E.S.C.O., are lecturers at St. Luke's College, Exeter. Written specifically for teachers who are not mathematicians, it contains full and clear suggestions about method, and emphasises the importance of helping children to grasp the written and spoken language. One of the most valuable sections (pp. 466-475) explains the construction of simple, effective and inexpensive apparatus.

The Teaching of Arithmetic in Primary Schools. K. LOVELL AND C. H. J. SMITH. U.L.P., 1953.

Number: An Account of Work in Number with Primary School Children. T. SMITH. Blackwell, 1954.

(d) Spelling

Research and the Basic Curriculum. C. M. FLEMING. U.L.P., 1946.

Chapter VI contains an account of research into the methods of teaching spelling together with a summary of research findings (p. 94-5) and an extensive bibliography.

Essentials in Teaching and Testing Spelling. F. J. SCHONELL. Macmillan, 1957.

A useful guide which contains the Essential Spelling List of 3,200 words graded and arranged into lists suitable for children from 7-12.

(e) Remedial Teaching

Backwardness in Reading. M. BREARLEY. N.F.F.

This short account written by the Principal of the Froebel Educational Institute is extremely interesting and practical. Reading readiness is analysed (p. 2) and reasons are given for postponing phonic training until a later stage (p. 3). There is an excellent bibliography.

The Causes and Treatment of Backwardness. C. BURT. U.L.P., 3rd edition, 1954.

This book, based on the long experience of the author as educational psychologist to the L.C.C., discusses the causes of backwardness and makes practical suggestions for remedial teaching (pp. 113-121). The differences between dull, backward and retarded children are clearly defined, and the author has avoided the use of technical terms not commonly understood by practising teachers.

Remedial Techniques in Basic School Subjects. G. M. Fernald. McGraw-Hill, 1943.

A well-illustrated book which describes the results of teaching reading, spelling and arithmetic to children in the Clinic School of the University of California at Los Angeles. Kinaesthetic techniques used in teaching children with extreme disability in reading are described and illustrated (pp. 35-51), many case-studies are included (pp. 273-318), and there is a valuable appendix dealing with individual differences in imagery.

Backwardness in the Basic Subjects. F. J. Schonell. Oliver and Boyd, 1942.

A comprehensive survey of the problems of backwardness in reading, spelling and English composition with test material for diagnostic purposes. The suggested topics for written and oral composition will be most useful, not only for remedial teaching, but also for teaching classes of average ability. There is a useful section on projects, activities and centres of interest (pp. 434-441), and practical guidance on marking English composition (pp. 477-489).

THE SUBJECTS OF THE JUNIOR CURRICULUM

(a) Literature

The Education of Dull Children at the Primary Stage. Cheshire Education Committee. U.L.P., 1956.

The section on stories and literature (pp. 47-50) of this excellent book provides a number of valuable suggestions about material for junior classes which may well be adopted by teachers of classes where ability is average or above average.

The Teaching of English in Schools. Macmillan, 1946.

A collection of essays on different aspects of English teaching. One may recommend L. A. G. Strong's excellent section on Poetry.

Poetry Speaking for Children. M. Gullan and P. Gurrey. Methuen, 1947.

An invaluable book of suggestions about material and methods which are particularly suited to the needs of the first classes in the junior school.

Teaching Poetry. J. Reeves. Heinemann, 1958.

In this book the author, himself a poet, makes clear how teachers may communicate their own love of poetry to children. About half the book is devoted to the teaching of juniors, and there are many suggestions about the selection and treatment of poems for the different age groups.

The Teacher's Omnibus of Stories (Books 1 and 2). L. Turnbull. O.U.P.

The two volumes of stories from traditional and folk sources, the literature of Europe and Asia, and from the Bible, furnish a readily accessible collection of tales to read and tell to children, and on which their expressive work in art and drama may be based. There is an excellent supplementary list of books at the end of each volume, and the essay by W. C. Berwick Sayers which introduces Volume Two suggests how to make story-telling effective.

English and Broadcasting in Primary Schools. B.B.C., 1951.

The introductory chapter in this book shows how the primary schools may enrich their children's experience of life by the selection and presentation of suitable literature. Reference is made to B.B.C. programmes for schools, to the reactions of children to them, and to suggestions for their use in stimulating an interest in literature.

(b) Dramatic Work

Drama and Education. A. F. ALINGTON. Blackwell, 1961.

Teachers who have enjoyed their first experience of drama under the direction of Mr. Alington at Ministry of Education Short Courses will find a valuable summary of the principles on which to base drama for young children.

The author's belief that drama is one of the arts through which children may grow and mature as human beings is expanded and developed in the Chapter, " Drama and Education," whilst later chapters explain the difference between creative and interpretative drama, assessing the relative values of each type.

Teachers who have habitually ' produced ' plays in which juniors would ' perform ' for an audience of parents may well be led to a revaluation of the educational merits of this practice.

This is a book which will repay careful study, particularly by teachers as they work out with children some of the suggestions contained in it, since its aim is the growth of understanding about children's needs and the part played by the arts in satisfying them.

An Introduction to Dramatic Work with Children. E. M. LANGDON. Dobson, 1948.

The author suggests how children's natural play in infancy may lead to richer and more varied work in drama under the influence of understanding teachers.

The Playmakers (Teacher's Handbook). M. COBBY AND E. NEWTON. Pitman, 1951.

We Play and Grow (Teacher's Handbook). M. COBBY AND E. NEWTON. Pitman, 1954.

Practical suggestions for children's dramatic work are made in the handbooks which are used in conjunction with the authors' series of school books for the different age-groups.

Drama in the Making (Teacher's Book). E. NEWTON AND J. MCCONNELL. U.L.P.,
(Class Books 1-4).
E. NEWTON AND J. MCCONNELL. U.L.P., 1955.

Teaching Mime. R. BRUFORD. Methuen, 1958.

This book by the Principal of the Rose Bruford College of Speech and Drama is full of suggestions for work with children in expressive and occupational movement. It will help teachers to understand the use and value of dramatic work, and will furnish suggestions for themes which may be used throughout the successive stages which lead to the production of mime plays.

The companion volume of *Music for Mime* by BARBARA LANDER, the author's colleague, will be most useful to the teacher whose powers of improvisation at the piano are inadequate for the purposes described.

An Introduction to Child Drama. P. SLADE. U.L.P., 1958.

A shorter and more practical book than the author's earlier *Child Drama*. Chapter IV, "What to do with juniors," suggests ideas for creative dramatic work with practical guidance about the best way to develop ideas coming from the children's improvisations.

(c) History

Teaching History. H.M.S.O., 1952.

Discusses the reasons for teaching History in the light of past and present practices (Ch. 1), and deals with the Primary School (Ch. 2), suggesting methods designed to stimulate and satisfy historical curiosity and to provide stories to feed the imagination of children and extend their experience.

History in the Primary School. C. F. STRONG. U.L.P., 1950.

This book by a former Director of Education for Tottenham states guiding principles for the compilation of a junior school syllabus (p. 13), and deals with methods of teaching History in Chapter 3. There are simple rules for the children's activities (pp. 44-54), and for the making of time charts (pp. 120-126).

A valuable feature is the appendix of suggested books for the use of teachers (pp. 134-40) and a list of addresses of sources of visual aids material (pp. 141-143).

The New Primary Histories (Books 1-4), illustrate the methods advocated (U.L.P.).

(d) Geography

Projects for the Junior School. R. K. POLKINGHORNE AND M.I.R. POLKINGHORNE. Harrap.

Contains suggestions for topics and centres of interest which illustrate the words of *Primary Education*, p. 289, "The knowledge which young children gather about their own surroundings and about the world at large is neither acquired nor organised as a number of differentiated school subjects."

Exploration in the Junior School. H. PHILIPS AND F. J. C. MCINNES. U.L.P., 1950.

Describes some of the work done by children in exploring their immediate environment. There are suggestions for the planning of work both in and out of school, and for the construction of simple apparatus. There is a valuable reference list of books for the use of classes and for more specific study by the teacher.

Geography and Education. H.M.S.O., 1960.

The larger format (7¼in. by 9¾in.) of this attractive book permits the inclusion of many well-selected illustrations and maps. Teachers of juniors will find much stimulus in the early chapters on the nature of Geography and on the development of Geography as a school subject. These should be regarded as essential to a full understanding of Chapter 4, "Geography in Primary Schools," which gives examples of work done by children, and which is particularly inspiring on the subject of field work.

There is a valuable appendix containing information about the equipment of Geography rooms which teachers will find of the greatest practical value.

Handbook for Geography Teachers. C. J. CONS AND R. C. HONEYBONE. Methuen, 1955; New Edition, 1961.

This handbook, prepared by the Standing Sub-Committee in Geography of the University of London Institute of Education, contains a number of important references to the teaching of Geography in Junior schools. MISS GARNETT's essay on the Primary School (pp. 11-25) outlines courses suitable for third and fourth-year pupils, and on pages 191-214 books suitable for class work and for libraries are listed.

The Junior Geography Lesson. E. J. BARKER. O.U.P., 1960.

The author states how the problems of planning lessons may be solved (pp. 7-9), taking into account the fact that most junior classes are large at the present time, and that it is vital both to engage and to sustain their interest.

There are useful sections on the use of pictures, books and maps together with an interesting section on the study of a local area (pp. 80-90).

The need for the precise understanding of terms is rightly stressed throughout the junior course, so that in subsequent studies of the homeland and of the world outside the pupils may grasp the significance of the study of Geography as a living subject.

(e) Nature Study

Scientific Interests in the Primary School. N.F.F., 1960.

In this short pamphlet there are many useful suggestions for providing children with opportunities of gaining a rich and stimulating experience of the natural world on which scientific knowledge may later be based.

The Teaching of Science. W. L. SUMNER. Blackwell, 1947.

See Chapter X, " Nature Study and Primary School Science." A short discussion of the aims to be followed in introducing juniors to a fuller appreciation of and delight in Nature. The content of the syllabus for rural districts and for towns is indicated, and there is a valuable book list containing work mainly suitable for the upper classes in junior schools.

(f) Religious Knowledge

Teaching Scripture. M. AVERY. Religious Education Press, 1951.

The reader will find, in addition to guidance in teaching the Old and the New Testament, suggestions for topics suitable for juniors together with exercises in creative interpretation involving the use of Art, Handwork and Visual Aids. There is a good bibliography of aids to lesson preparation (pp. 188-90).

Teaching the Bible to Juniors. H. T. HUGHES. Newnes, 1949.

This ' companion to the teaching of the bible ' is based on the L.C.C. Agreed Syllabus. There is a useful section on answering children's questions, and the reader will find help in explaining the meaning of forgiveness, prayer and temptation (pp. 87-94).

Seeing Things. A. J. Watts. S.P.C.K., 1959.

A book full of suggestions for the use of charts, diagrams and other pictorial devices in the teaching of many subjects to Juniors. The section on story-telling (pp. 76-7) will be of great value in religious education. There are, in addition, practical hints on the construction and use of flannelgraphs (pp. 83-91), and on the use of diagrams and summaries (pp. 147-151).

The author rightly warns the teacher that no gadget or slick method of presentation can disguise a religious or spiritual vacuum in the teacher himself.

Teaching Religious Knowledge. B. R. Youngman. U.L.P., 1953.

This book discusses syllabus-making for juniors (p. 35) and lists topics for the different age ranges. Comparisons are drawn between the content of a number of agreed syllabuses, and in Part 2 there are helpful suggestions about the treatment of children's questions (pp. 100-108). The bibliography contains a wide range of references.

(g) Art and Craft

Story of a School. Stone. H.M.S.O., 1949.

In this valuable short account of work done in a junior school in Birmingham, the author shows how the arts may revitalise the curriculum. The link between movement, art and drama is persuasively described, and reasons are stated for the success of the methods adopted. Puppetry enthusiasts will no doubt disagree with the author's conclusions about their limited value (p. 22), but all should find both illustrations and text stimulating, though they may not be convinced with the author that it is wrong to teach academic subjects before children have experience of expression in the arts.

Art and Craft in the Primary School. J. Dean. A. and C. Black, 1961.

Mrs. Dean makes it abundantly clear that for children, as for mature artists, art is a language, a means of communication. The illustrations of varied work done by children of different ages are very well selected in order to help teachers who are considering their aims and methods of art and craft teaching.

Nineteen chapters are devoted to a wide range of art and craft work in different media, while the final section (Ch. 22) emphasises the need for correlating art and craft in planning work for children of 5-7 years, 7-9 years, and 9-11 years.

This is certainly a book which no teacher of juniors can afford to miss, since it will certainly stimulate both pupils and teachers.

Creative and Mental Growth. V. Lowenfeld. Macmillan, New York, 1953.

The author identifies and describes the stages of art growth through which children pass, emphasising the need for an understanding of these stages and of the needs of individual children. The chapters devoted to work with juniors contain suggestions for themes, and there are colour reproductions of children's work to illustrate the range of their interests.

Teachers of handicapped children will find much to interest them in the section on therapeutic aspects of art education.

Principles of Art Teaching. R. Mock. U.L.P., 1955.

The writer's experience as Art Adviser to the West Riding Education Committee has enabled her to give sound practical advice on materials (Ch. 2), and on the choice of subjects (Ch. 3). Imaginative work helped by observation and drawing from memory is described, and the criticism that art education provides no incentive for development and progress is faced squarely in Chapter 4.

There are also suggestions for schemes of work (p. 61) and for training in handwriting and lettering (Ch. 7).

The importance of crafts in helping children to develop control, and the necessity of introducing children to work which they can continue at home without expensive tools, is stressed.

Art in the Junior School. N. Nelder. N.F.F.

Another excellent pamphlet from the Froebel Foundation which emphasises the importance of expressive work in art in the development of children and suggests themes for imaginative treatment. The appropriate media are discussed (p. 5) and the need is stressed to make work more challenging as powers and practical manipulative skill develop.

(h) Music

Music in Schools. H.M.S.O., 1956.

Contains a most interesting and well-written introduction tracing the historical development of music teaching. Chapter 1 includes suggestions for primary school work, including methods of teaching a song (pp. 12-17), and music and movement (p. 14). The importance of listening to music leads to a consideration of the extensive resources available through the use of B.B.C. Music for Schools broadcasts.

Music in the Primary School. D. M. Parr. N.F.F., 1959.

Non-specialists in junior schools will find much encouragement as well as much practical information in this small volume. There is an excellent list of songs for juniors (pp. 42-3), references to books about music and music for recorders (p. 46), and titles of pieces for children's listening.

An Outline of Musical Education. (Prepared by the School Music Section of the Incorporated Society of Musicians.) Curwen Edition No. 8351.

A concise statement of aims and methods to be followed in teaching children from 7-9 (pp. 10-13), and 9-11 (pp. 13-14). Material suitable for these groups will be found in other works mentioned below.

The Oxford School Music Books. R. Fiske and J. P. B. Dobbs. O.U.P., 1954.

(a) Teacher's Manual.

(b) Class song books.

This excellent and practical guide to all aspects of junior school music contains a rich collection of songs, each with a simple but effective piano accompaniment. Many favourites from the B.B.C. Schools' Broadcast lessons are included, and there are, in addition, lists of gramophone records suitable for appreciation lessons (pp. 290, 296-7, 298-300). The authors mention (p. 292) five ways of putting children off good music for life.

Music in the Primary School. H. W. SHAW. Dobson, 1952.

The author discusses the reasons for differentiating between creative work in Art, Craft and English at the junior stage and comparable work in Music. Methods of teaching voice production are described (pp. 72-3), and there are generous lists of songs suitable for class singing (pp. 82-4) and of music for listening (Ch. 8).

(i) Physical Education

Physical Education in the Primary School. H.M.S.O.

Part 1. Moving and Growing, 1952.

Part 2. Planning the Programme, 1953.

A survey of children's development with suggestions for work based on their needs at successive stages.

Physical Education for Children. D. C. JOYNSON. Kaye, 1954.

A book planned in accordance with the principles enunciated in the H.M.S.O. volumes named above. Teachers whose own training was on formal lines will find many suggestions for creative and expressive movement in Chapter 7 (pp. 177-199).

(j) The School Library

The School Library. H.M.S.O., 1952.

This well-illustrated little book contains many useful references, particularly to the publications of the School Library Association, in addition to discussing the value of libraries throughout the life of school children.

Books for School Libraries. J. A. M. DAVIS AND H. E. S. WOOD. N.F.F., 1950.

In this list are books suitable for use by children reading for information about the extensive subject range which modern topic work covers. Some books of real quality are deserving of inclusion because of their illustrations, although not every child would find the text suitable for study.

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MR. A. LEA PERKINS

The late Mr. A. Lea Perkins, a former Secretary of the N.F.E.R., died quietly sitting in his chair on 8th February last at the age of 82.

Mr. Lea Perkins was at Emmanuel College, Cambridge, where he took his degree in Mathematics. When he came down from Cambridge he taught for four years at a school in Wandsworth and in 1904 went to teach in Brighton at the Pupil Teachers' Centre, now Varndean Grammar School. He served on the staff of that school for exactly forty years, becoming Head of the Mathematics Department and Careers Master. He became Chairman of the Association of Assistant Masters in Secondary Schools in 1942.

Over a period of many years Mr. Lea Perkins took a keen interest in the methods of selection of pupils for grammar school education and he was chief examiner for several local education authorities. In March, 1944 he was appointed the first Secretary to the National Foundation for Educational Research, a post which he held for some years. During these early years, Mr. Lea Perkins undertook much of the heavy work of establishing the Foundation as an independent body. He was also keenly interested in public service and, indeed, until his death he was an active member of the Brighton Education Committee.

A.W.S.H.

The Teaching of Mathematics—IV:

TEACHING ARITHMETIC BY CONCRETE ANALOGY—II. STRUCTURAL SYSTEMS[1]

by J. D. Williams

IN this article eight systems of teaching arithmetic and elementary mathematics will be described. Common to all of these is their use of apparatus of the kind described in the previous two articles in this series[2]. It has become usual to call these systems 'structural'—probably after Catherine Stern's use of this description in her book, *Children Discover Arithmetic*. The advisability of using this term is questionable, for, if used in Stern's sense, it implies that the defining quality of these systems is that they reveal mathematical structure; but mathematical structure can conceivably be taught without resort to such systems, and to teach it is not always their main aim or achievement.

However, if used without regard to its origin, the term seems approximately apt, for these systems use apparatus that is 'structured', in that it has been specially devised, and 'structurable', in that it can usually be used to build 'structures'. It is likely, then, that 'structural' will continue to be used, although not with its original justification.

The object of this article is to present the teacher with a brief picture of the main features of the structural systems that are at present being used for teaching arithmetic and early mathematics in this country. It is hoped that in each case enough detail will be given for teachers to come to a reasonable opinion of the system in the light of their own views and interests. No attempt at appraisal of the systems will be made here, for such an attempt would involve making assumptions about the psychology of mathematics learning which are not clearly supported by evidence or an accepted theoretical framework. An attempt to provide a theoretical framework will be made in the last article in this series, and perhaps this will give some indication of the lines along which to argue for or against these methods; but objective evidence is needed before the weight of such arguments can be known, which is a pity, for such evidence is not available.

Four of the systems to be considered are essentially very much alike. These will be dealt with in the first section. Of the others, the Montessori has some features in common with these four, but is sufficiently different to merit a separate section. The Dienes, Lowenfeld and Bass methods will also be considered separately.

In order to facilitate comparison, each system will be described in three parts: first a brief review of the apparatus (in most cases this has been more fully described and illustrated in the previous articles in this series), then an account of the theory underlying the system, and finally a synopsis of the technique used.

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[1] In the case of five of the eight systems described, the originator of the system or an authority on it has been consulted. The author acknowledges help from the following: Mr. and Mrs. W. G. Bass, Miss Dwyer (of the Montessori Association), Mr. B. R. Jones, Dr. M. Lowenfeld, Dr. Z. Lubienski (Lowenfeld system), and Mr. H. Shaw.

[2] "Teaching Arithmetic by Concrete Analogy—I. Miming Devices," *Educational Research*, Vol. III, Nos. 2 and 3.

Systems Using Models of the First Decade

The four systems first considered might be described as 'measuring' systems. In each, the fundamental device is a set of ten pieces, each piece corresponding in size to one of the numbers from 1 to 10. This basic similarity in apparatus is reflected in the systems, a brief comparison of which will be made at the end of this section. It is hoped that the description that follows will be sufficiently detailed to enable users of one system to transplant techniques from others. Since the basic apparatus—ten lengths—is so simple, prospective users might construct similar apparatus for themselves from wood or cardboard, and select from the systems a course of instruction which suits their own teaching problems.

STERN

Apparatus

Only the main devices are described in this section; some supplementary apparatus is mentioned in the section on technique.

1. Blocks one to ten cube units long.
2. A "Counting Board" bearing ten numbered grooves, into each of which one of the blocks fits exactly.
3. Ten "Pattern Boards", each of which will receive a different number, from 1 to 10, of unit cubes in pits arranged in two rows.
4. "Number Trays" 10 × 10 units in capacity, and a set of square "Number Cases" from 1 × 1 to 10 × 10 units in capacity.
5. A "Number Track" consisting of ten 10-unit sections with a central groove, which, when all sections are joined, will contain blocks measuring 100 units.
6. A "Dual Board", accommodating ten 10-blocks at one end, and 9 units at the other.

Theory

Stern's views on learning have a close affinity with those of the *gestalt* psychologists: she maintains that the best learning takes place when an insight is obtained into the *structure* of what is learnt; then, she maintains, the child is able to reconstruct every step in the learning process and transfer what is learnt to new situations. Neither drill nor representation in 'life situations' is able to teach the child more than isolated number facts, and, in order that the concepts uniting such facts should be appreciated Stern has attempted to construct apparatus which parallels in a concrete form, intelligible to children, the *structure* underlying arithmetic.

Another of Stern's *gestaltist* views on learning is that it should result from *productive thinking*: children should *discover for themselves* the concepts underlying arithmetic. Accordingly, her apparatus is contrived so that experiments with it are likely to reveal mathematical structures; it is meant to be 'self-corrective', so that children can immediately discover any errors they have made.

Finally, Stern stresses the value of *measurement*, as opposed to *counting*. Neither words nor symbols have any *intrinsic* numerical significance, but can gain it by association with the perception of numerical properties of objects. These properties are much easier to distinguish where the objects can be measured against one another, so that they can be *visually* compared, without counting.*

Technique

First, the child plays games with the materials—replacing blocks the teacher has removed from the counting board, guessing to which pattern board a configuration of units belongs, fitting missing blocks into the number cases, completing 'stairs' of blocks, etc.

Number Names and Symbols

The child learns to count the number of unit cubes required to fill each of the grooves of the counting board, and then associates the different number-names with blocks of different sizes and different pattern boards.

Cards bearing number-symbols are matched with number names, blocks and pattern boards, and arranged in correct sequence. At first, only symbols up to 5 are used; each of these has on it an appropriate number of large dots. Eventually the number track is used, and simple additions are described by means of symbols.

In learning to write numerals, children fit solid numerals into grooves, trace these grooves with their fingers, and then trace the dotted outlines of numerals with pencil and paper.

Addition and Subtraction up to 10

Blocks are arranged side-by-side to form stairs progressing by steps of one or two units; by building each step up to the level of the next, the result of adding one or two is seen. The result of *subtracting* one or two units is discovered by removing blocks from the counting board.

The ten pattern boards are separated into odd-number and even-number boards so that the general difference in patterns can be seen. These two kinds of pattern board are then used to show that both odd and even-number series progress by twos, but that whereas even numbers comprise pairs of equal numbers ($3 + 3 = 6$), odd numbers comprise pairs of consecutive numbers ($3 + 4 = 7$).

All addition and subtraction facts up to 10 are discovered by combining and separating blocks in the number cases. Without the cases addition can be depicted by simple end-to-end combination of blocks, and subtraction by covering one block with another. Special attention is given to the explanation of zero.

Addition and Subtraction to 100

The following activities help to teach the structure of 2-place numbers: (i) 10-blocks and units are matched with cards appropriately positioned in a holder; (ii) adding and subtracting is carried out on the dual board; (iii) a stair is built up to 10; after this a similar one up to 20 units high is built on to 10-blocks in a tray 20 × 20 units in size (the '20-case'); (iv) the sections of the number track are placed in order, numbers are sought on it, and blocks are measured with it.

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*See the introduction to the first article in this series.

The 20-case is used for several experiments with stairs, in which the number-facts up to 20 are discovered.

Likewise the number track has several uses: (i) tens can be added to or subtracted from any number; (ii) by breaking the track into sections the numbers within different decades can be compared; for example, the 10-20 section can be placed alongside the 60-70 section; (iii) when bridging decades (e.g., when adding 8 to 47) the children build up (or in subtracting, down) the larger number to the next round number by using part of the smaller number ($47 + 3 = 50$), and then add the remainder of the smaller number to this ($50 + 5 = 55$).

After adding and subtracting with the dual board it is appreciated that the figures in the tens position signify ten times the quantity of those in the units position.

Multiplication and Division

Different parts of the multiplication table are learnt, as far as possible, in different ways: (i) the ten times table: 10-rods are placed on the dual board, which has numbers across it so that the sum of any number of rods up to ten can be read off; (ii) 5 times table: even multiples are half of the ten times table, odd multiples are this plus 5; the 9 times table is also derived from the 10 times table; (iii) from knowledge of doubles (2 × 6, etc.) the 2 times table can be worked out by covering say two 6-blocks with six 2-blocks; by means of this device a variety of commutative relationships in multiplication ($A \times B = B \times A$) are demonstrated; (iv) all tables can be practised by measuring multiples of blocks on the number track.

The number of divisor blocks that add up to the dividend block or blocks is the quotient, and when an exact number of the divisor blocks does not equal the dividend, the difference is the 'remainder'. The dual board can be modified to take blocks smaller than ten-blocks by partly filling the tens space with a card. Then various numbers can be seen to comprise so many sixes, sevens, etc.

Common multiples are shown to be the points on the number track at which multiples of different numbers coincide.

Fractions

Ten fraction frames, each divided into a different number of equal parts—from 1 to 10—are used for measuring ready-made fraction-plates or pieces of cardboard cut out by the child.* Addition and subtraction of fractions with the same denominator is carried out by adding to or taking from plates already in a frame. Divisions on the frame can be matched to demonstrate equivalence of fractions. Many other aspects of fractions can be taught with the fraction frames.

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*As described in the first of this series of articles.

The Decimal Number-System

Blocks similar to the Dienes base-10 blocks* can be used to demonstrate the structure of the decimal number system. Borrowing and carrying can be shown by exchanging larger for smaller pieces and vice versa. It is shown that multiplying or dividing by 10 merely alters the order of 10 that a number represents. Decimal fractions can be demonstrated by using the 1,000-cube as the unit.

Problem Solving

Children make up block problems of their own, and are given more by the teacher, but they are not introduced to problems in 'life situations' until they have mastered the basic addition and subtraction facts. Then they are posed problems, first in pictures and later in words. At first they solve these with their blocks, but later they are able to dispense with these.

CUISENAIRE

Apparatus

A set of 241 rectangular rods 1 sq. cm. in cross section and 1 - 10 cm. in length is used. The unit rod is white and the 7-rod is black, but the other rods are grouped into colour families: the reds (vermilion = 2, crimson = 4, brown = 8), the blues (light green = 3, dark green = 6, blue = 9), and the yellows (yellow = 5, orange = 10). A chart representing (in colour) products up to 10 × 10, lotto cards and individual product cards supplement the rods.

Theory

Cuisenaire[†] suggests that his coloured rods enable children to associate *seeing* with *doing*, *understanding*, *reckoning* and *checking*. His description of the mechanics and desirability of this is unsystematic, but runs somewhat as follows:

Visually, the rods' dimensions and colours afford a double link between numbers, but the child's *need for action* also finds an outlet in the spontaneous construction of numerous meaningful combinations, and such activity gives rise to *understanding* and *interest* and results in facility in *reckoning*. A further merit of the rods is that they provide opportunity for the child to *check his own results*, thus teaching him to rely on his own criteria for correction of mistakes.

Thus, children can discover arithmetic at their own pace, by exercises that produce clearly-defined sensory images but gradually lead to the abstract conceptualisation of number. Because the child learns to deal with number as a result of his own constructions and experience, he develops without strain and with intense interest a flexible and objective approach to number. Play and observations lead naturally on to systematic work.

Gattegno[†], in a book written jointly with Cuisenaire, holds that learning proceeds by four stages:

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[*] As described in a later section and in a previous article in this series.

[†] Cuisenaire, G., and Gattegno, C., *Numbers in Colour*.

(a) *experience* of a situation is gathered by manipulation and trial and error;

(b) this experience is then *translated* into some sort of language which may be that of words, drawings or notation;

(c) experience and language must be welded into a dynamic whole in which either can suggest new steps with the other;

(d) after this sort of mastery of the situation it can be used as a basis for further developments.

Technique

Acquaintance with the Material

After some periods of free and directed play with the rods, during which the interchangeability of various combinations of rods is often discovered, children learn to associate colour with size. Gattegno suggests games to encourage this association, one of which is as follows: each child builds a staircase by placing rods in order of size on their ends, after which he first selects from three rods held behind his back one whose *colour* the teacher calls out, and then selects from rods whose full length is hidden one whose *length* the teacher calls out.

Notation

When the colour names are familiar, but before the number-notation is introduced, operations with the rods can be written down with the initials of the colour names, e.g., y(ellow) + r(ed) = b(lack).

Preferably after experience with this more natural colour-notation, number-names and symbols are introduced, first up to 5, then up to 10 and eventually beyond 10.

Addition and Subtraction

Staircases are built, starting with rods of various sizes, and increasing by units, 2-rods, 3-rods, etc. The rod equal to the amount by which steps increase is shown to combine with any step to form the next step. Further addition facts are discovered by end-to-end juxtaposition of rods, while subtraction facts are discovered by side-by-side juxtaposition. Addition eventually acquaints the child with numbers beyond 10.

Multiplication and Fractions

Decompositions requiring rods of only one colour form the basis of multiplication, e.g., $8 = 2 + 2 + 2 + 2$ can be written as $8 = 4 \times 2$ and represented by placing four two-rods side by side to form a rectangle. This rectangle can be symbolised concretely by means of a 4-rod *crossing* a 2-rod. It will be discovered that some numbers cannot be decomposed in only one colour (prime numbers) and that multiplication crosses can be inverted (commutation).

Exercises of a more abstract nature, using colours alone, can be carried out with the product cards, on which the child has to place a disc which is the colour of a product in a circle flanked by crescents which are the colours of the factors of this product. These cards, together with the wall charts and lotto games, give plenty of practice with products.

Fractions follow from multiplication. If $3 \times 4 = 12$, 3 is described as $\frac{1}{4}$ of 12, and the fraction depicted by standing the 3-rod on end at the end of the rods representing 12. Taking larger rods as units, smaller rods may be used to represent fractions. If a 1-rod stands for $\frac{1}{3}$, a 4-rod represents the improper fraction $\frac{4}{3}$. The equivalence of different fractions can be shown by forming a double staircase, of numerators and denominators. In this way it can easily be shown that if numerators and denominators of equivalent fractions are added or subtracted, a further equivalent fraction results.

Division

This is carried out by fitting a smaller rod as many times as possible into a larger rod or combination of rods. The remainder is ascertained by making up any difference with an extra rod.

Duplication

Rods are grouped by colour so as to emphasise doubles and halves (2, 4, 8), (3, 6), (5, 10), and the multiplication tables have been arranged so as to emphasise doubles and halves. Thus, many number relationships are reduced to the simple operations of doubling and halving.

Geometry and Algebra; Social Arithmetic

The rods have obvious uses in explaining linear measurement, area and volume, and can also be used for depicting many algebraic processes. It is recommended that arithmetic should be mastered with the rods before it is applied to real-life situations, for the latter contain irrelevancies that would otherwise confuse the child.

SHAW (with "STRUCTA" apparatus)

Apparatus

1. Cylindrical pegs, which fit into peg boards and, for vertical structuring, into one another. Number rods are formed by sets of these unit pegs which are permanently structured. Number rods of different values have different colours.
2. A 20-base, consisting of two rows of 10 holes into which the pegs and rods can fit. These rows are divided by a groove, into which number cards may be slotted.
3. Peg boards.
4. Number cards that fit into the central slot of the 20-base.

Theory

In his book and in an article* Shaw preludes the description of his method with an account of some educational and psychological findings in accordance with which the method has been devised.

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*Details given at the end of this article.

On the one hand he argues against teaching by 'incidental methods' whereby the child is introduced to number through a series of 'life situations' and thus expected to find motivation to think about number. This sort of teaching presents only a fragmentary picture of number and the situations it uses often obscure the arithmetic they embody.

On the other hand he objects to the formal, 'deductive', systematic presentation of number facts to be learnt by mechanical insightless repetition in accordance with Thorndike's 'connectionist' rules of frequency, recency and intensity.

Opposing these two approaches, Shaw recommends the use of structural apparatus. Such apparatus enables children to discover mathematics for themselves, and to develop an interest in number for its own sake, permits a more thorough exploration of number than do 'life situations' alone, and presents mathematics on a concrete level in a way that is comprehensible. He points out, however, that children must be encouraged to 'verbalise' as well as to manipulate, so that their experiences can become organised into coherent ideas.

Shaw also considers Piaget's views on conservation and reversibility, points out the necessity for the child to grasp both of these before engaging in insightful number work, and maintains that their appreciation can be accelerated by the use of a structural apparatus such as his.

Technique

Number names and symbols up to 10

In teaching, say, the number 2, two pegs are placed in one of the rows of the base and related to pairs of objects with which the child is familiar. Then they are counted ("one, two") as they are structured into a 2-rod. The structured numbers are placed in sequence in the other row of the base, and are compared with the permanently-structured rods, which can then be used as reference material for ascertaining the value of other structures. The variety of configurations by which each number can be represented is shown by arranging patterns of pegs on the peg-board, and then structuring the pegs from each pattern into a number rod to demonstrate how many pegs have been used.

Numeral cards, bearing the symbol on one side and the written number name on the other, are fitted into the base in positions corresponding to the positions of the number rods.

Number Families

The rod standing for the number of the family to be considered is placed at the end of a base. Next to it a 1-rod is placed, and the child is invited to select a rod that will make this up to the height of the original rod. Next to the 1-rod, a 2-rod is placed; this, also, is made up to the height of the original rod, and so on.

The Meaning of 10

Rods 1-10 are arranged in serial order on a base, and then, using 10-rods, the numbers 11-20 are structured on an adjoining base. The similarity of 1-10 and 11-20 can then be seen.

A Tens and Units chart is fitted into the base. This accommodates a structure of only nine pegs in the units column, and nine 10-rods in the tens column.

Addition and Subtraction through the Decades

The Hundred-Chart is used in this process. This is a card bearing ten columns, each of which is divided into ten sections, numbered upwards, and each of which represents one of the decades from 1-100.

The Hundred-Chart is slotted into the base and after each of the rods from 1-9 has been measured in the first (units) column this column is filled with a 10-rod, and the rods 1-9 are measured in the second (teens) column. The second column is then also filled with a 10-rod, and the rods 1-9 are measured in the third (twenties) column, and so on, thus demonstrating the recurrence of 1-9 through the decades. In a similar way, this time by structuring 2-rods in different decades, the recurrence of 2, 4, 6, 8 and 0 through the decades can be demonstrated. Again, adding first one number and then another to each of the decades, the similarity of say 3 + 4, 43 + 4, 63 + 4, etc. and, later, of say 7 + 5, 47 + 5, and 67 + 5, can be shown. Subtraction can also be demonstrated in this way.

Using these techniques, additions and subtractions involving the units can be related to the same processes involving the higher decades.

Addition and Subtraction of Tens and Units

The Tens and Units Chart is divided into ten columns: a units column on the extreme right, against which can be structured up to 9 units, and, to the left of this, nine tens columns, each of which will hold a 10-rod. This card is placed in the central slot of a base, and another base is placed in front of this. Thus there is accommodation for three rows of rods in front of the card. For addition, the first two rows will accommodate the addends and the third will accommodate the sum. Where the addends of the units column make more than 10, a ten-rod is substituted for the 10 units and moved to the tens columns. Likewise, in subtraction, the first two rows accommodate the minuend and subtrahend while the third accommodates the difference. Where the subtrahend in the units column exceeds the minuend, the latter is supplemented by converting a rod from the tens columns into units.

Addition and subtraction of shillings and pence is demonstrated in a way similar to the above. A 10-rod and a 2-rod are structured to form a shilling-rod, and a Shillings and Pence Chart analogous to the Tens and Units Chart is used.

Multiplication and Division

Pairs of self-checking cards are used, one side of each card bearing the product or quotient, and the other side bearing the corresponding multiplication or division. One card of each pair shows the terms reversed. Multiplication and division pairs are differently coloured. In the case of 12, one family of cards would be 3 × 4; 4 × 3; 12 ÷ 3; 12 ÷ 4.

As a check on the rod-structures formed, Multiplication Charts are used. These are tables of Pythagoras which fit into the bases. Consider $6 \times 2 = 2 \times 6 = 12$. Two 6-rods are structured in the first column of a chart. An equal structure is then formed on another base with 2-rods. The two 6-rods are then placed in consecutive columns, and so are the six 2-rods. In both cases the number reached on the chart can be seen to be 12.

For division, bases are arranged on end to form a number line. A number of pegs equal to the dividend is arranged along it, and then re-arranged into structures equal in size to the divisor. The number of such structures is the quotient. In all cases, self-checking cards are matched with the structures formed.

More Advanced Work

In his manual (which is not yet published) Shaw describes how these materials can be used for teaching more advanced arithmetic and algebra. Some of the subjects covered in his manual are: fractions, ratio, decimals, percentages, series, quadratic functions, logarithms, simple and compound interest and probability. At the end of the manual is a section on aids in the teaching of geometry, in which devices other than those described here are employed.

JONES (with "AVON" apparatus)

Apparatus

1. Flat number-pieces, 1 to 10 inch-square units in size, and, except in the case of the unit piece, two units wide. A large dot for each unit gives each piece a characteristic pattern, and on the back of each piece is painted the appropriate number symbol.
2. A number tray divided into five separate channels, each of which will hold a structure two units wide.
3. A notation tray, accommodating nine 10-pieces on the left, and nine units on the right.
4. Number channels 2 units wide, which will hold pieces to the value of 20 and 100 units respectively, and are graduated in multiples of ten.

Theory

In a brief outline of the rationale of his method, Jones suggests that arithmetic is the art of dealing efficiently with *groups* of things and *bits* of things. Instead of dealing with the groups and bits directly, we translate them into symbols, manipulate the symbols instead of the things, and then translate the symbols back into things.

Since numerical concepts are abstractions from physical situations they can be really understood only in relation to such situations, and, if the symbolic function of numbers is to be properly grasped, numerical experience with actual groups of things is vitally needed. The Avon apparatus parallels each number up to 10 with a structured group of units whose numerical significance is easily recognised by virtue of size, shape, and configuration of dots (this ease of recognition minimises the need for counting).

These groups of units can be manipulated in a way that parallels the manipulation of numbers, so that eventually the child sees why we manipulate numbers as we do when we substitute them for groups of things.

The apparatus is not meant to replace 'life experiences', but to supplement them in a unifying and systematising way, so that the basic concepts underlying number activity are understood and the associated number facts memorised.

Verbalisation of operations is given great importance, and it is suggested that children should be encouraged to use the briefest intelligible verbalisations possible.

Technique

Free Activity

Pieces can be used to form stairs, patterns, models, prescribed shapes (e.g., those of such letters as E and H) and to cover suitable surfaces. Such activities give counting experiences and involve judgement of shape and size, and the covering procedure lays the foundation for the concept of area.

Addition

Any two pieces placed end to end can be compared with another piece, or a combination of a ten-piece and another piece, to give an addition fact. For speed of formal operation, additions involving a sum from 2-18 are memorised as basic facts; e.g., 8 + 7 = 15 is memorised, for it would take too long to separate the 7 into a 2 and a 5, and work out the addition as 8 + 2 = 10 and 10 + 5 = 15. The various combinations that make up a given number can all be depicted side-by-side in the number tray.

In the number channel, additions of more than two numbers can be depicted (e.g., 7 + 6 + 5) and the similarity between additions in different decades can be demonstrated (e.g., 14 + 5, 34 + 5, 74 + 5).

Using the notation trays, addition of two-digit numbers may be paralleled. Where the sum of the units exceeds 10, a 10-piece is 'carried' into the tens' compartment. Addition combinations involving zero (e.g., 5 + 0, 0 + 7, etc.) also arise naturally as abstractions from situations in which one or both of the units' compartments of the notation trays is empty.

Subtraction

Two kinds of physical subtraction are considered: one kind is 'taking away'—because this is a simple reversal of the addition process, the basic subtraction facts should be learnt in conjunction with the addition facts; the other kind involves a comparison of two groups in order to see how much larger one is than the other. The latter comparison may be effected by superposition of pieces or by side-by-side comparison.

When subtraction of two-digit numbers is recorded in column fashion there are three rows of figures: the minuend (the initial number), the subtrahend (that which is to be taken away) and the difference. Where the 'taking away' interpretation is used, the subtrahend row refers not to a separate group but to that part of the minuend-group which is to be removed. For this reason, it does not make sense to depict the subtrahend separately as an actual group of things; therefore an exact physical parallel to the written example, in which all three groups are simultaneously visible, is not possible.

However, where the 'comparison' interpretation is used, minuend and subtrahend stand for different groups and both can be represented concretely at the same time. Thus, for the subtraction of two-digit numbers, three notation trays, as in addition, can be used, each representing a line of the written subtraction example.

To allow for cases where 'borrowing' is necessary, room has been made in the units' compartment of the notation tray to accommodate an extra 10 units in a 'temporary' fashion.

In such cases the 'equal additions' and 'decomposition' methods may both be illustrated most effectively by using the 'comparison' interpretation; the former method by adding units to the units' compartment of the minuend tray, and a ten-piece to the tens' compartment of the subtrahend tray. Before doing this the principle of 'conservation of difference' is established by noting the invariance of the 'sky-line' in two adjacent number channels as the groups represented in them are increased by the same amount, and in particular when they are increased by ten.

Multiplication and Division

In multiplication, so many pieces of a certain value are added in the number channel, and the product ascertained either by measuring it with inverted 10-pieces or by using the numbers on the sides of the channel. In both cases the number of tens and the size of the residual group are obtained separately, and the amalgamation of these into a single number is deliberately left to the person using the apparatus.

Jones stresses the importance of distinguishing between *partitive* division, in which the aim is to establish the size of each of a given number of groups into which the dividend-group is to be separated and *quotitive* division, in which the aim is to establish the number of groups of a given size. He holds that it is necessary to make this distinction in order to provide for the corresponding types of practical situation (and therefore of problems) that actually arise.

In quotitive division, the dividend is set out in the number channel and covered by the appropriate number of divisor-pieces; this number is the quotient. In partitive division, however, the child has to make a rough estimate of the size that each of a certain number of pieces needs to be if they are to cover the dividend, and then to try out his estimate and adjust it if necessary.

The Decimal Number System

10-pieces can be grouped into arrangements similar to those of the unit pieces, thus showing the similarity between 10, 20, 30, etc., and 1, 2, 3, etc., and between the corresponding additive and subtractive manipulations. 100-pieces can also be formed, and likewise arranged and manipulated. Experience with the notation tray further helps with the appreciation of the decimal system.

Other Aspects of Mathematics

Fraction-terminology is introduced by describing smaller pieces as fractions of larger pieces, and operations with fractions can be illustrated.

Length and area can be measured by the number pieces, since each is constructed from inch-square units. The bottoms of the number trays are 1ft. square, so by covering these with number pieces the relationship between square inches and square feet can be ascertained.

Factors, multiples, square numbers and triangular numbers can also be depicted and algebraic relationships involving the latter can be developed on an inductive basis.

A Comparison of the Measuring Methods

At this point the methods will be compared only in terms of apparatus and technique. The theory underlying these methods has enough in common with that of the others to justify a general comparison in terms of this at the end of the article.

Apparatus	*Number-lengths or pieces*	*Supplementary containing and measuring devices*
Stern	segmented lengths based on a unit cube	number tracks and trays
Cuisenaire	unsegmented lengths based on a unit cube; colour notation	none
Shaw	segmented lengths based on a unit cylinder; vertically structured	pegboards, bases and cards
Jones	structures of flat, square, dotted units, arranged in double rows	number tracks and trays

Technique

1. Addition is taught by placing pieces end-to-end and subtraction is taught by placing them side-by-side (or, in some cases, by covering one with another). The result can be measured either by other pieces or by a supplementary measuring device.

2. Multiplication and division are taught by placing so many equal pieces on end and comparing their total length either with other pieces or with a measuring device. (In the Shaw method, the pegboard can be used.)

3. The significance of position in the decimal system is illustrated by using a number of 10-pieces to represent the figure in the tens position. The exchange of 10-pieces for unit-pieces represents 'borrowing' and the reverse represents 'carrying'.

4. Ratio and fractions can be illustrated by showing that the size of one piece is relative to that of another, e.g., where the 6-piece is taken as unity the unit-piece will be one sixth. (In the Stern method a special fractions device is used.)

Apparatus

Because of its diversity, the relevant apparatus will only be listed here, and will be briefly described when its use is discussed in the section on technique. This is by no means *all* of the apparatus used in the Montessori system, but is most of that which is used at primary school ages.

Number rods; spindle boxes; sandpaper numerals; decimal material; bead bars; strip boards; 'stamp game' material; counting frames; multiplication and division boards and charts; division containers and racks; fraction apparatus; indices material; specially prepared work-paper and cards.

Theory

It is not always easy to extract the theoretical principles underlying Montessori's method. Sometimes she gives special attention to a principle but gives no definitive statement of it; at other times she brings in what could be construed as a general principle merely with reference to some particular area of teaching. However, there follows an attempt to formulate some of her essential ideas.

Montessori's aim was twofold: to teach, and to discover the nature of the child's development. Occasionally, one is led to suspect that one of these aims was sacrificed to the other, but, on the whole, the principles underlying her method suit them both.

Her theory can be placed into three categories: principles, general strategies and insights. Sometimes, but not always, her general strategies are determined by her principles and sometimes, but not always, her insights can be seen to contribute to them.

Principles

What might be called the *principles* behind the Montessori method are really three very much interconnected points of emphasis in a complicated plexus of thought. They are by no means independent of one another but, together, they perhaps could be said to form the cornerstone of the method.

(i) *Spontaneity.* Through a process of 'auto-education' the child should be allowed to unfurl his potentialities in an environment optimally suited to his unimpeded development.

(ii) *Liberty.* As a prerequisite to (i) the child's behaviour must be prescribed minimally. With as little interference from the teacher as possible, the child will be able to pursue a course of learning that is in line with his own inclinations and abilities.

(iii) *Individuality.* As a prerequisite to (i) and (ii) each child should be allowed to learn in his own way and at his own pace; in the case of some activities this will be compatible with group work and even collective lessons, but in other cases individual work will be necessary.

Strategies

Montessori uses several techniques for achieving the teaching system that is based upon the above principles:

(i) *The scientific study of the child.* Because the child is allowed to learn in the way that is most natural to him, aspects of his development which would otherwise be masked can be studied.

(ii) *The scientifically-prepared environment.* The child's choice and interest are used as criteria for selecting apparatus from which he can either gain insight directly or prepare himself for this insight. At different periods of development different kinds of apparatus and general environment are found to be suitable. The apparatus is devised so as to isolate those aspects of the environment that are relevant to the concept or skill being learnt, and is usually such that the child can discover and control his own errors while manipulating it. The use of such apparatus enables the child to discipline his own behaviour in accordance with the requirements of the environment.

(iii) *Removal of restrictions on subject matter and age.* There are no rigidly-prescribed times or ages for engaging in particular activities.

(iv) *Education of the senses and motor education.* Children perform certain discriminations and skills which will enable them to refine their perception and discipline their actions.

(v) *Séguin's three periods.* In teaching nomenclature, the name is first given with the experience to which this name refers, then the child has to recognise the name as being associated with the experience, and, finally, he must recall it.

Insights

Montessori had several significant insights into the nature of children's learning. Some of these form a basis for her method.

(i) *The sensitive periods.* At a certain stage in his development the child will be strongly attracted to a certain kind of activity. He should be allowed to engage in this while the attraction lasts and should not be constrained to engage in it before the attraction begins, even though this might disrupt what is thought to be the 'logical' sequence of stages in learning mathematics.

(ii) *Repetition of the exercise.* Young children tend to repeat again and again operations which to the adult might seem to have been adequately learnt. The child should be allowed to exhaust his need to repeat an operation for two reasons: (a) such consolidation of learning is necessary; (b) interruption of this activity might reduce the child's potential for concentration on self-directed endeavour.

(iii) *The three stages of learning.* Learning proceeds in the following three stages: (a) indirect preparation (learning, one at a time, the *components* of the concept or skill); (b) formation of unconscious knowledge (integration of these components without conscious effort); (c) spontaneous realisation. By learning in this way, the child is not made to produce the required behaviour until he is quite ready to do so. Thus the likelihood of faulty understanding or performance is reduced.

(iv) *Motivation and the need for purposive activity.* It is a mistake to think that children need to be encouraged to engage in directed activity by the administration of external motivators in the form of punishment and reward. It is often because their own plans for doing things are continually disrupted by interference from adults that they seem to lose interest. When they are brought up to do things in compliance with their *own* schemes and motives they develop a capacity for ordering their actions according to an *internal* discipline.

Technique

Of the systems considered here, Montessori's is the oldest, and over the years it has grown and changed. Because of this, the following will not cover more than the essential techniques, and might well differ in some respects from other accounts.

Preparatory experiences

Before coming to the learning of number, the child has had experience with various sets of solid shapes, from which he has been able to abstract certain notions of width, length, depth, shape and order which will help him in this learning. Preparatory exercises are also calculated to give the child an 'attitude of exactness' which is thought to be very necessary in arithmetic.

Basic number

Number proper is introduced by the manipulation of ten large number-rods, ranging in length from 10 cm. to 1 m., with alternate units differently coloured. The child has already had acquaintance with these, and is soon able to arrange them into a 'stair', count the units in each rod, name the length of each rod, and count the number of rods.

Sandpaper numerals enable the child to develop a visual and kinaesthetic impression of the shapes of number-symbols (later, the kinaesthetic impression will help the child to learn to *write* the symbols). These symbols are then associated with the rods.

When the principle of counting has been abstracted by manipulation of the rods, separate objects (for example, 'spindles' which are kept in a container with ten compartments) are counted, and groups of counters and other separate objects are associated with number cards. Special attention is given to the meaning of zero.

The decimal system

After children had learnt the numbers 1-10 one might expect that they should learn those from 11-20. However, by giving children the choice, Montessori found that they were more ready to use the apparatus illustrating the decimal system. This they were well equipped to do, for one needs only to be able to count to 9 in order to count the tens up to a hundred, the hundreds up to a thousand, etc.

The main apparatus used consists of: loose unit beads; ten of these in a row, forming a '10-bar'; ten 10-bars, forming a '100-square'; ten 100-squares, forming a '1,000-cube'. Alternatively, the 100-piece can consist of a chain of ten 10-bars, and the 1000-piece can consist of a chain of ten 100-squares or one hundred 10-bars.

Children learn to represent their manipulations of this material with superimposable cards: short cards bearing the unit number-symbols, which can be used for covering the '0' on longer cards bearing the tens, which, in turn, are long enough to cover the '00' of still longer cards, bearing the hundreds, etc.

At this stage also, the 'stamp games' are played. In these, the unit of each order of 10 is represented by a small square of wood or card. Units are green, and marked '1'. Tens are blue, and marked '10'. Hundreds are red, and marked '100'. Thousands are again green and marked '1,000'.

With both of these kinds of material, addition, subtraction, multiplication and division are carried out. In the case of the division of the stamps, the divisor is represented by small appropriately-coloured skittles and discs, and stamps representing the dividend are lined up by these in equal columns—the number of stamps per column being the quotient.

Counting. The teens and higher decades.

In this period, the combinations of bead bars that make the teens are discovered. The relationship between addition and subtraction becomes clear. The bead bars used here are from 1 to 10 beads long, and each is a different colour. In one of her works, Montessori observes that children develop with these a great facility at mental arithmetic by thinking of operations in terms of colours. By using bead bars 1-9 with various numbers of 10-bars, the higher decades are studied.

Chains of bead bars are counted in units and groups of units—the latter giving further insight into multiplication and division.

Systematising and memorising number facts: tables

Already, children will have learnt many number facts, but, in this period, increasingly systematic exercises are carried out in the four processes before various tables of the facts are constructed and memorised.

In addition and subtraction, various bead bars are linked in a line to form a 'snake'. The length of such a 'snake' can be increased or decreased, and measured by means of 10-bars and remainder.

After this, 'strip boards' are used. Strips of cardboard or wood 1-9 units long and in two colours, can be placed on end to show various additions up to 18 and subtractions from numbers up to 18. There is room on a board to place several different combinations side-by-side, so that the overall pattern formed by such combinations can be appreciated. Numerals across the top of the board tell the child which quantities are involved.

Multiplication tables are first constructed in concrete, out of bead bars; e.g., from left to right there are laid out one 2-bar, then two 2-bars, then three 2-bars, etc. At another stage before the final formulation of multiplication and division tables and charts, the Multiplication and Division Boards are employed. Roughly speaking, these are pegboards; for multiplication 10 × 10 holes, and for division 9 × 9 holes in size. On these, the number of beads per column represents the multiplicand or divisor, the number of columns represents the multiplier or quotient, and the total number of beads represents the product or dividend.

Out of these concrete experiences children are able to construct charts and tables which systematise the facts they have discovered.

Operations in several figures: passage to abstraction

For this purpose, the counting frame is used; a small four-wire frame is used at first, for operations involving units, tens, hundreds and thousands, and, later, a larger, seven-wire frame is used for operating with millions. On these frames, an extension of the colour scheme of the 'stamp game' is used: units/green counters, tens/blue, hundreds /red, thousands/green, tens of thousands/blue, etc.

Operations with the bead material and 'stamps' are related to operations with the counting frames, and then the child learns to record these operations on specially-prepared paper. This paper is printed with vertical lines which are coloured to correspond with the frame's horizontal rows of counters. A figure representing the number of counters moved on any wire of the frame can be recorded on the appropriate vertical line on the paper. This apparatus affords an easy transition to the conventional setting-out of numbers, for we normally set out our written numbers with orders of ten progressing from right to left, and not, as they do on the counting frame, from top to bottom.

Addition and subtraction are easily performed with the counting frames, carrying and borrowing being depicted by the exchange of one bead on one wire for ten beads on another.

In long multiplication, an analysis of the example is first written out. Thus 35 × 42 is seen to be 3 tens and 5 units multiplied by four tens and by two units. The units product can be recorded on the frame first, or the tens product can be. The sum of the products is automatically registered on the frame. Later the process is carried out on prepared paper, ruled into vertical columns corresponding to the wires and representing different orders of ten. Here, the insertion of noughts after a number helps to indicate its order of ten.

Long division, which follows from earlier work with the decimal material and stamp game, is carried out by a procedure that is too involved to describe justly here. Numbers of the dividend signifying different orders of ten are represented by different colours of bead. There is a container for the beads of each order of ten, and the inside of each container is the same colour as the beads it contains. The *outside* of each container is coloured white, grey or black to show whether it contains numbers up to a thousand, numbers of thousands, or numbers of millions. Thus, the colours of the beads and containers used to depict 3,241,576 would be as follows:

		3	2	4	1	5	7	6
Bead colour	..	green	red	blue	green	red	blue	green
Container inside	..	green	red	blue	green	red	blue	green
Container outside	..	black	grey	grey	grey	white	white	white

The division boards are used for carrying out the dividing, and a rack bearing tubes of ten beads is used when it is necessary to convert a bead of a higher order to ten beads of a lower order.

Factors and tables

Two multiplication tables are used, one including multiplications whose products do not go beyond 50, the other including multiplications whose products range from 50 to 100. Factors of the same product (e.g., 3 × 2 and 2 × 3) are selected from these tables and a list of numbers and their factors is prepared. It is noticed that some numbers (prime) cannot be factorised. Factors are depicted by groups of beads (e.g., 3 × 2 by 3 groups of 2 beads) and it is seen that division is the inverse of multiplication. Factors are factorised, with the aid of beads, and prime factors found. Likewise, the highest common factor of two numbers is discovered. On simple tables of 1-100 arranged in rows of ten, the child underlines all multiples of three, etc., noticing the characteristic pattern in each different table.

Indices

Each bead bar from 2 to 9 is used as the base for a square and a cube; equivalent chains are also constructed. In the case of the 10-bar, of course, the squared version is the 100-square, and the cubed version the 1000-cube.

Fractions and Geometry

The fraction material, consisting of circular insets divided into different numbers of sectors, was described sufficiently fully in the previous article for its uses to be apparent.

Montessori gives a great deal of attention to the use of apparatus for teaching geometry, but this is beyond the scope of the present article.

Further work

Further work with the apparatus already described, and work with further apparatus introduces the extraction of roots, binomials, trinomials, and, it is claimed, a learning-sequence which extends up to university level.

DIENES: the M.A.B. and A.E.M.

Theory

The Multibase Arithmetic Blocks (M.A.B.) and The Algebraical Experience Materials (A.E.M.) are different sets of materials, which, as their names suggest, cover different stages in the learning of mathematics. However, they stem from the same conception of mathematics teaching, and the same principles govern their use.

The object of the materials is to provide children with basic experiences which will encourage them to abstract, and eventually to formulate mathematical concepts.

Dienes considers it extremely important that children should discover the concepts for themselves with a minimum of direction from the teacher. In this way each child can learn in a way that suits himself, and children will become involved in discovering mathematics for its own sake.

The necessary experiences are provided by means of a series of tasks which the children perform with the materials. The tasks are printed on individual cards, so that each child can work at his own rate. Children can work from these cards individually, in pairs, or in groups.

The tasks are devised in accordance with four principles:

1. *The Constructivity Principle.* By *constructing* embodiments of mathematical concepts, children are held to be able to appreciate these concepts at an age at which they would not yet be able to appreciate them *analytically*, that is, in terms of their component relationships.

2. *The Dynamic Principle.* Concepts are best learnt in a sequence of: (i) play with their components, (ii) structured play leading to an awareness of the concepts, (iii) formulation of the concepts followed by practice.

3. *The Perceptual Variability Principle.* Abstraction of concepts is facilitated by presentation of each concept in a variety of concrete embodiments. This principle is particularly in evidence in the A.E.M., in which there are several different kinds of material.

4. *The Mathematical Variability Principle.* Likewise, abstraction of mathematical concepts is facilitated in arithmetic by demonstrating with a variety of numerical values. In accordance with this principle, the M.A.B. presents an opportunity for carrying out arithmetical operations in a variety of number-systems. This is a unique feature of the method.

Apparatus (M.A.B.)

The Multibase Arithmetic Blocks are in five sets. In each set there are pieces of wood of four different sizes: units (small cubes of side approximately 1cm.), longs (a number of units on end), flats (an equal number of units in length, breadth and 1 unit deep) and blocks (an equal number of units in length, breadth and depth).

The sizes are in ascending geometrical progression with a common ratio which is 3, 4, 5, 6, or 10 depending on which set they come from. The 3-base and 4-base sets are duplicated.

Thus, in set 3, 3 units = 1 long, 3 longs = 1 flat and 3 flats = 1 block, while in set 10, 10 units = 1 long, 10 longs = 1 flat and 10 flats = 1 block.

The faces of the longs, flats and blocks are grooved, so as to give the appearance of being made up of unit cubes.

Technique (M.A.B.)

Dienes's treatment of the four rules is roughly as follows:

Children are first led to discover that 3 units = 1 long, 3 longs = 1 flat, 3 flats = 1 block in the base-3 set, and similar facts for the other sets; they are then in a position to carry out addition and subtraction in the various bases. This they first do without carrying or borrowing. Addition is carried out by setting out the two addends in columns as shown in the diagram, and then simply gathering together those pieces in the same column to form the sum.

Blocks	*Flats*	*Longs*	*Units*
1	2	1	2
	2	2	1
2	2	1	0

Addition with the base-3 set

Where there are sufficient pieces in one column to form one of those in the next column to the left these are changed for such a piece, and this is 'carried' to the next column. Subtraction is performed by: (i) removing as many pieces from the minuend row as there are in the subtrahend, and (ii) seeing how many pieces are needed to build up the subtrahend row until it equals the minuend. Where the subtrahend values are greater than those of the minuend, the latter is added to by 'borrowing' a piece from the next column to the left and exchanging it for smaller pieces.

Division is deemed to be easier to understand, when concretely represented, than multiplication, so is done first. A number of pieces of each shape is shared between a number of children that is equal to the divisor. The largest shape is shared first, and any pieces of this shape remaining after sharing are exchanged for pieces of the next smaller shape. When a remaining piece can no longer be exchanged for smaller ones, this is regarded as the 'remainder'. The significance of dividing by the number of the base is discovered.

Simple multiplication is learnt, but compound multiplication is not approached until (with the help of the A.E.M.) the distributive law has been understood.

The special effect of multiplying by the base number is discovered.

Children are taught to record the operations they perform with the blocks, and, where the child is slow to appreciate the relationship between these operations and their symbolic representation, semi-concrete materials like coloured counters and the abacus can be used in intermediate tasks.

The M.A.B. material is well suited to the teaching of decimals and vulgar fractions: in these cases, a larger piece is taken as the unit. Powers and logarithms can also be conveniently illustrated.

Apparatus (A.E.M.)

In accordance with the Perceptual Variability Principle, the materials are of four different kinds:

1. A balance, along the two arms of which are equally spaced hooks at equal distances from the fulcrum. Weights are in the form of metal rings which can be hung on the hooks at various distances from the fulcrum.
2. A pegboard, with a large number of variously coloured pegs.

3. Flat rectangular pieces of wood, forming ¾ inch squares, larger squares and rectangles, and strips ¾ inch wide and equal in length to the sides of the larger squares.
4. Flat pieces of wood forming equilateral triangles of various sizes.

In order further to facilitate abstraction, the teacher is also directed to provide containers into which objects may be grouped; these constitute a fifth kind of material.

Technique (A.E.M.)

The series of tasks available to the children is too lengthy and involved to be intelligibly summarised here, but four different tasks leading to the abstraction of the commutative law of multiplication ($A \times B = B \times A$) will be briefly described as an example of the kind of learning situation provided by the A.E.M.:

(i) An oblong rectangle is formed out of small squares. This is A squares from top to bottom and B squares from left to right. It is then turned on its side, so that it is now B squares from top to bottom and A squares from left to right.

(ii) Likewise, a rectangle is formed on the pegboard out of columns of pegs, and the child appreciates that the number of columns times the number of pegs per column equals the number of rows times the number of pegs per row.

(iii) Again, on one arm of the balance, A rings are hung on hook B, and then the child discovers that to balance these, B rings are needed on hook A of the other arm.

(iv) Finally, starting with A matchboxes, each containing B matches, the child shares the total number of matches equally between B matchboxes, and finds that he then has A matches in each.

Intelligent children might be able to abstract that $A \times B = B \times A$ by completing just one such task, but even the less intelligent will eventually abstract this relationship as the only component common to several analogous but different tasks.

The tasks at present available cover a great deal of the algebra needed in the early stages of secondary school learning, and more are being prepared to cover later stages.

An M.A.B. and A.E.M. joint set has been prepared to help graft the arithmetic learnt with the M.A.B. on to the mathematics learnt with the A.E.M.

LOWENFELD

Apparatus

There are three sets of blocks:

1. Poleidoblocs G ("Basic"). This set consists of coloured blocks of the following shapes: cubes of three sizes; sections of these, cut diagonally to form prisms, horizontally to form slabs, and twice vertically to form pillars; flat oblong blocks, whose surfaces are multiples of the cubes; cylinders of various sizes; cones and pyramids.

2. Poleidoblocs A. This set consists of plain blocks of the following shapes and sizes: rectangular prisms 1in. to 5in. in length, and, in cross section, ½in. × ½in., 1in × ½in. or 1in. × 1in.; some rectangular prisms 5in. × 2in. × ½in.; right-angled isosceles

triangular prisms ½in. thick, whose equal sides are 1in., 1½in., 2in. or 2½in. in length; 24 half-inch cubes; thin, 1in. metal squares.

3. Poleidoblocs G ("Tetra"). Whereas the "Basic" set is for use with infants, the "Tetra" set is for use with junior and secondary school children; in this form, some of the cylinders are replaced by regular and irregular tetrahedra, whose base is equal in size to half of the diagonal of a two inch square.

Theory

In some provisional introductions to her method, Lowenfeld suggests that much of the difficulty children find in learning mathematics is due to the gulf between the kinds of observations and thought that are needed in learning mathematics and the kinds for which children are equipped in their early school days. In the child's pre-school environment, his interests are personal, his actions are to a large degree spontaneous and he "lives through his senses". One of Lowenfeld's main objectives at the infants' and junior school levels is to provide a bridge between the pre-school environment and the school learning situation.

The following five points give a brief guide to other features of Lowenfeld's system:

(i) *Design of the materials.* The materials are constructed so that fundamental mathematical relationships can be represented by them as simply as possible. They are meant to be of use in presenting both elementary and advanced mathematical concepts. While it is recognised that variety of experience is needed before abstraction can take place, care has been taken not to present the child with *too great* a variety of material lest this should mask the underlying unifying principles.

(ii) *The child's manner of learning.* The material provides opportunity for the child to discover for himself by manipulation, using the tactile and kinaesthetic as well as the visual sense, the basic principles of mathematics. This discovery comes about first through spontaneous play, and then through activity guided by the teacher's suggestions. The principles are first grasped in a concrete form, and only later symbolised.

(iii) *The aesthetic pleasure of mathematics.* The aesthetic pleasure enjoyed by the adult mathematicians is paralleled by the pleasure experienced by the child in building concrete structures that reflect mathematical relations. This kind of pleasure motivates interest in mathematics.

(iv) *The diagnostic use of the material.* Differences between child and child, and between child and teacher, in manner both of conceptualisation and learning, constitute a serious obstacle to class teaching. From his pupils' free construction with the material, the teacher is able to gain a direct insight into their styles and stages of thought.

(v) *Testing with the material.* It is possible to use the material for devising tests of the degree to which true understanding of mathematical concepts has been achieved.

Lowenfeld has been using a very empirical approach to discovering the potentialities of these blocks, and her suggestions for their use are by no means in final form; her procedure has been to introduce them into schools, ask teachers how they find them useful, and, finally, endeavour to incorporate teachers' observations into the development of a teaching procedure.

While wishing in no way rigidly to prescribe the use that teachers make of the materials, she has given provisional suggestions as to how they should be used. Below is an account of some general directions together with some samples of specific exercises that she recommends.

Technique

It is intended that the blocks should be used throughout the school: at the infants' level to give children experiences *preparatory* to the learning of mathematics, at the junior level as instruments in the *analysis* of mathematical relationships, and even at the secondary level where, although they have already learnt the relationships, pupils can benefit by seeing these relationships embodied in, and illustrated concretely by the blocks.

In the case of the younger child, learning should proceed in three stages:

(i) playing with the blocks in ways that draw attention to their characteristics; here the teacher records on prepared record forms the salient characteristics of the child's constructions;

(ii) performing tasks in a directed way, which involves *use* of such knowledge of their interrelationships as is gained in (i);

(iii) making a pencil and paper record (a *formulation*) of what has been done with the blocks.

Children should pass from one stage to another only when the teacher considers that they are ready to do so.

Before they can use the material to learn mathematical principles, pupils will need to know some of the spatial properties of various pieces. As an example of Lowenfeld's procedure, her "experimental description" of the square will be outlined.

A *square* piece is taken, its sides are counted and it is found to have *four sides*. Each of these sides is then found to fit the side of one of the rectangular pieces, and, further, it is seen that there is no overlapping of superimposed square pieces if the top one is turned through 90°; thus the *sides are equal*. Again, it is found that any of the corners of such a piece will fit into a pencil drawing of one of the corners; thus, all four corners have the *same angle*. It is discovered that there are "square spaces" as well as square blocks.

Several exercises then follow in which squares are built in a variety of ways, and the numerical properties of the areas of series of progressively larger squares are examined—play following each discovery.

Finally, the child is tested with the material, and when it is clear that he understands the properties of the square, the properties of non-square rectangles are introduced.

Thus, through a series of directed exercises, games, free play and tests, the child discovers the properties of the shapes he will later be using, in a similar manner, to discover more advanced mathematical relations.

Note. Although there exists a manual giving a clear account of the application of this system in the infants' school (including a great deal of junior work) this manual is out of date in some minor particulars, and Bass has gone a long way towards completing an extended replacement for use from the infants' to the secondary school level.

Apparatus

1. The One-to-One Board. This consists of a row of eleven small compartments, each of which corresponds to a number from 0 to 10. Counters with or without numbers inscribed on them can be placed in these compartments. (An earlier version of this apparatus, the 'Counterplay Board', is described in the book by Bass and Dowty and in the previous article in this series.)

2. Multiplication Tablets. These are 1in. square tablets, bearing either numbers or letters, and are used with the One-to-One board and squared paper for building up the multiplication tables. In some uses of these tablets the substitution of letters for numbers introduces the idea of pronumerals. This apparatus replaces the Multiplication Board previously described.

3. Number Lines and Tables. These are due to comprise a booklet; by means of exercises on number-lines pupils learn to construct a variety of tables.

4. The Mathematical Board. This provides a squared background on which points on the periphery of a circle are marked at 0°, 10°, 20° . . . 350°. At the centre of the circle, a transparent plastic rotating vector is pivoted. A groove across the bottom of the board holds a slide, which can be used for demonstrating the construction of the slide rule. A T-square can be used with the board.

Theory

From the outset children must learn arithmetic and mathematics in a way which will enable them to *integrate* their later learning, and to *translate* situations into arithmetical formulations. To these ends, Bass uses the following means:

(i) One-to-one correspondence. The authority for saying that there are 5 items in a group ultimately derives from the fact that if these items were matched one-to-one with the series 1 2 3 . . . , the last matching would be with the number 5. By introducing number through this basic matching activity, and by presenting arithmetic and mathematics in a way that enables children to interpret their later learning in these terms, Bass aims to ensure that the meaning of arithmetical and mathematical operations remains explicit.

(ii) Preparation for conventional formulations. Many of the conventional formulations of arithmetical processes conceal the operations involved. Bass introduces these processes using formulations which make explicit the component operations; the child is then able to pass on to the more conventional formulations with a clearer knowledge of what he is doing.

(iii) The product-multiplier relationship. In learning their multiplication tables, children are shown that the multiplicand (2, in the case of the 'twos' table) can be expressed as a matching relationship between the product and multiplier (e.g., between 6 and 3 in "three twos are six"). It is shown that *any* ratio between two numbers can be translated into a multiplication table—or series of equivalent product-multiplier relationships. This manner of considering numbers—in terms of their ratio properties—provides a means for the easy reduction of 'problems' and new mathematical processes to the basic matching process.

Technique

Since no account of the operation of the Bass method at the junior and secondary levels has yet been published, the greater part of this account will concern the infants' level.

At this level, learning takes place in three stages: (i) children act, (ii) they use apparatus, (iii) they use symbols.

Counting by actions

First, the concepts 'more', 'less' and 'as many as' are learnt by matching numbers of boys with girls, chairs with tables, etc. Then numbers of children are matched with number cards 1-10, which are displayed on the wall. Children face consecutive cards, so that each child is paired with a card; the last card-child pairing is then the number of children in the group.

In addition, children representing the first addend match themselves with consecutive number-cards, and then children representing the second addend continue the series of pairings, until the last child is matched with a card; this last pairing is the sum. In subtraction, (from 10, say) ten children stand with their backs to the cards, and number off in a direction opposite to that in which the cards are numbered.

Brackets are used in multiplication. Inside the brackets is the number of children facing each card (the multiplicand) and, outside, the number of cards being faced (the multiplier). Children then spread out one per number-card, and the product, which is the last card-child pairing, is read off. In division, children face away from the cards, one per card to represent the dividend, and then group themselves in groups equal in size to the divisor against a number of cards equal to the quotient.

Counting with apparatus

The exercises previously acted are now carried out with the One-to-One Board. Instead of moving himself, the child now moves counters which bear arrows to point towards numbers on the One-to-One Board for addition and multiplication, and away from them for subtraction and division.

The multiplication table is constructed by counting in ones, then twos, then threes, etc. In the case of each table a counter indicating the multiplicand is placed at the end of the One-to-One Board, and number-tablets representing the products are matched with a series of numbers, 1-10, representing the multipliers. After some tables have been constructed in this way, children will understand the significance of the whole set of tables.

The Number Line

Along a line marked 0-10 on the floor, and later on paper, steps are taken forwards to 10 for addition and multiplication, and backwards to zero for subtraction and division. This line is then extended to −10, and the operations carried out with negative numbers. Using such a device, the subtraction of negatives and multiplication by negatives can be portrayed.

Having become familiar with negative numbers at an early age by using this device, children are able to use them in subtraction examples; e.g., 37 − 9; 9 from 7 = −2, therefore 2 must be subtracted from a ten, leaving 2 tens and 8 units. Later, complements of 10 are used.

The use of number lines is developed in many ways: tens and units are taught and various tables are built by means of them. Fraction number lines are used to show the relationship between unit fractions from $\frac{1}{2}$ to $\frac{1}{10}$, and that fractions of the same denominator behave like whole numbers.

Later work

The most conspicuous feature of Bass's treatment of more advanced arithmetic and mathematics is the emphasis that he places upon the product-multiplier relationship. By conceiving of numbers in terms of this, and using the Mathematical Board as a visual aid, children are expected to be able to integrate their understanding of arithmetic, trigonometry, algebra and geometry at an early age, and accept the supposedly difficult notions underlying the differential calculus with relative ease.

Considerable emphasis is given throughout the child's learning to the translation of a diversity of problem situations into similar kinds of calculation. The product-multiplier relationship is particularly useful in making this possible.

SOME COMPARISONS

Apparatus

A detailed comparison of the apparatus used in these systems was given in the previous two articles, so only a few general points will be noted here.

Representing the 1st decade. All methods excepting the Bass, Dienes and Lowenfeld employ number-pieces depicting numbers 1-10. Bass uses instead of these his One-to-One Board and the Counting Line, for he holds that number-pieces give children too narrow a view of the meaning of number. The Lowenfeld and Dienes materials can be used for *constructing* lengths from 1-10, but the Dienes method is for use in the junior school, where there should be less need for such pieces.

The use of colours. Stern, Shaw and, in her Poleidoblocs G, Lowenfeld, use colours merely for differentiation between pieces, while Jones and Bass do not use them at all. However, both Cuisenaire and Montessori make great use of colour: Cuisenaire uses a colour notation; Montessori uses this means in order to symbolise differences between orders of ten in such semi-symbolic devices as the stamp material, counting-frame, division material, etc. While Dienes's arithmetic apparatus does not include coloured pieces, he recommends the use of colour in the transition from concrete to symbolic representation.

Diversity of apparatus. The measuring systems tend to employ their fundamental set of 1-10 number pieces consistently throughout. Supplementary 'guiding' and measuring apparatus is used, however, in all but the Cuisenaire.

Lowenfeld anticipates using no more than her basic blocks, but these are extremely diverse in themselves.

Dienes's apparatus is intentionally diverse, for he holds that the multiple embodiment of a concept facilitates its abstraction.

Montessori also intentionally uses a diversity of apparatus, but while Dienes's different kinds of apparatus are used 'in parallel', hers are used 'in series'. Montessori uses a graded series of devices which range from very concrete to relatively abstract in their manner of depiction. In the Dienes method, on the other hand, the gradation from the concrete to the abstract is achieved not so much by using a graded series of devices, as by using the same set of devices in each of a graded series of tasks.

Bass uses different pieces of apparatus at different stages in the child's learning, but: (a) there are not many different kinds of apparatus, and at each stage the appropriate apparatus integrates a remarkably wide field; (b) although his pieces of apparatus are physically very unalike, they are functionally similar, in that the concept according to which they are operated is the same.

The kind of mathematics taught

It would be surprising if precisely the same mathematics were taught with these systems as without: in the case of most of them the proponents claim an earlier introduction to many parts of the syllabus than is usually possible, and many give unusual emphasis to certain points in the syllabus. However, with the exception of the Dienes, Bass, and, possibly, Lowenfeld, these systems could be said to provide a new way of teaching 'conventional' mathematics, rather than to give a new view of mathematics. Dienes's departure is to teach arithmetic in a variety of number systems; Bass's is to present mathematics in a way that makes explicit matching relationships. Since the details of her technique have not yet been settled, it is not yet possible to say whether the view of mathematics presented in Lowenfeld's system will be essentially new.

Similarities of theoretical viewpoints

Here are some theoretical views which are held by the proponents of many, and in some cases all of the systems being examined:

1. Children should learn not only to perform arithmetical and mathematical operations, but to understand these operations. The manipulation of concrete material is more intelligible to the child than is the manipulation of symbols.
2. Structured material affords a more systematic treatment of arithmetic and mathematics than do 'real-life' situations.
3. The material can be used as a diagnostic tool. Lowenfeld points out its use for giving the teacher insight into the child's thought processes and for testing the child's understanding. Montessori, by observing children's spontaneous manipulations, studied aspects of their development.

4. The representation of each number from 1-10 by a different number-piece reduces the likelihood that arithmetical operations will be carried out by counting. Proponents of the measuring systems stress this as an advantage of their apparatus, but Bass considers that this kind of depiction constitutes an obstacle to the appreciation of the principle of one-to-one correspondence that underlies numeration.
5. Children should learn by discovery, and the material makes this kind of learning easier because it is 'self-corrective'.
6. Learning should take place at the child's own pace. Dienes has provided for this kind of learning by means of sets of work-cards.
7. It is often stressed that the kind of activity engaged in when learning insightfully and through discovery is intrinsically motivating, so that external motivators, in the form of punishments and rewards, are not necessary.
8. In some systems the learning process is analysed into stages. Although their analyses are not exactly alike, Dienes, Montessori, and Lowenfeld all consider that before a concept is formulated its components should be learnt, and that a period of practice should follow its formulation.

Age range and literature

Almost always the proponents of these systems claim that their material can be used to teach mathematics to a level well beyond that of the junior school. Often it is possible to conceive that this is so, but in only a few cases is there a detailed account of how this should be done. Since the existence of such an account is very relevant to the age to which the system is suited, these two factors will be considered together.

In the table below, 'I' stands for the infants', 'J' for the junior and 'S' for the secondary school level.

	Teacher's Manual	*Work Books*	*Suitable Age*
Stern ..	.. comprehensive	not available in this country	I, J
Cuisenaire	.. short	comprehensive	I, J
Shaw ..	.. comprehensive (but only a brief pamphlet is published)	comprehensive (but unpublished)	probably I and J
Jones ..	.. only a brief pamphlet is published		probably I and J
Montessori	.. comprehensive	——	I, J and S in scope, but usually used for I and J
Dienes ..	.. comprehensive	comprehensive card system	detailed provision made for J and S; latter still being prepared
Lowenfeld	.. only a brief pamphlet is published		intends I, J and S, but so far only I is prepared
Bass ..	.. comprehensive but only infants' manual published	——	new manual gives detailed attention to J and S, but published manual to I only

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Cuisenaire, G. and Gattegno, C., *Numbers in Colour.* Heinemann, 1954. Materials are obtainable from the Cuisenaire Co., Ltd., 11 Crown Street, Reading.

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Dienes, Z. P., "The Growth of Mathematical Concepts in Children through Experience." *Educational Research*, Vol. II, No. 1, 1959. The materials are supplied by the National Foundation for Educational Research in England and Wales, 79 Wimpole Street, London, W.1.

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Jones, B. R., Newton Park College, Bath, has devised the 'Avon' number apparatus, and written a pamphlet on its use—both of which can be obtained from James Galt & Co., Ltd., Brookfield Road, Cheadle, Cheshire.

Lowenfeld, M. A manual for use with the Poleidoblocs G and A is being prepared and should be ready shortly. These materials together with an introduction and suggestions for their use, are obtainable from Dr. M. Lowenfeld, 92 Harley Street, W.1.

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Montessori, Mario M., "Maria Montessori's Contribution to the Cultivation of the Mathematical Mind." *International Review of Education*, Vol. VII, No. 2, 1961. This contains an up-to-date account of the mathematical applications of the method.

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Shaw, H., "The Development of the Child's Conception of Number." *Educational Review*, Vol. 13, No. 3, 1961.

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Note on the Unifix method

The use of the Unifix materials was not covered in this article, for at the time of writing, no Unifix manual was available. However, such a manual has since been prepared* and should be available by the time this article is published.

The manual does not present what could be called a "system" of teaching arithmetic, but simply shows how the material can be used to depict various arithmetical processes.

As would be expected from the basic similarity in materials (see the two previous articles in this series), the Unifix procedure in many respects resembles that of Stern.

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* Tavener, N., *The Unifix Manual* 1962, Philip and Tacey, 69-79, Fulham High Street, London, S.W.6.

THE MEASUREMENT OF PERSONALITY–III.

by F. W. Warburton

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Criticisms of personality assessment

VARIOUS objections have been made to the use of objective tests, questionnaires and ratings in the analysis of personality, and the approach to personality by means of atomisation into isolated traits or variables is often called into doubt. One objection is that this method is static and gives little account of the dynamics of behaviour. This is largely true. If a person is regarded (as, for example, in Cattell's scheme) as comprising: A (Sociability) +C (Stability) +E (Dominance) +F (Liveliness) +G (Conscientiousness) +H (Extraversion) +I (Sensitivity) +L (Suspiciousness) +M (Bohemianism) +N (Shrewdness) +O (Anxiety) +Q_1 (Radicalism) +Q_2 (Dependence) +Q_3 (Self-sentiment) +Q_4 (Tenseness) then we feel rather constricted if asked to explain the 'dynamics' of an unrepentant criminal, solely in terms of these characteristics, particularly if we are charged with the task of attempting to change his outlook. There are a hundred and one individual events and accidents in a person's life that have to be considered in order to put together a reasonable account of his motives and behaviour, and they cannot all be forced conveniently into fifteen categories. There are other psychological systems more closely connected with motivation, such as the psychoanalytic theories of the unconscious, repression, rationalisation, etc., which carry conviction and are more dynamic than the psychometric approach. Any particular piece of behaviour depends on such multiplicity of factors in the personality and in the environment that no one ever reacts in accordance with a single trait. But this does not mean that it is reasonable to ignore the results of vast researches as if they had never been carried out, simply by calling them 'static'; in fact, there is a great deal of life in the categories proposed by Cattell, by Eysenck and by Guilford; and an account of an individual's personality and behaviour solely in terms of Cattell's fifteen traits, given by a person who is fully acquainted with their use, by no means presents an unmoving picture of the situation. The primary mental abilities are also relatively static elements in the overall development of individual children, but they have considerable scientific validity and powers of prediction.

Another objection frequently raised is that trait theories neglect the situational determinants of behaviour and over-emphasise the generality of behaviour. The same child may display very different characteristics at home, at play with his friends, and in school classes under different teachers. The tests are thereby thought to be invalidated. In a research designed to throw light upon the effects of the testing situation on test scores, Thorpe and James studied three groups of children aged 11-13 years equated on age, sex and intelligence. These groups were given a battery of neuroticism questionnaires and objective performance tests. The main criterion for the selection of tests was that they had in previous studies been shown to discriminate between normal and neurotic groups. The results indicated that all the tests, questionnaire or objective performance alike, were to some extent affected by the testing situation, the questionnaires being so much affected as to be virtually useless in discriminating between normal and neurotic groups when the testing situation is more strictly controlled. However, the objective performance tests still appeared to behave in the manner expected. It is true, of course, that differences between the behaviour of the same child on different occasions lessen the overall value of tests, but this objection merely underlines one of the main difficulties in establishing external validities, i.e., that in order to cover all situations thoroughly, a large number of separate validity coefficients has to be calculated. On the other hand, the influence of role-playing and the situation can be much exaggerated. One of the most striking characteristics of people is that their major personality traits are relatively immutable. In how many situations is Mr. Kruschev less extraverted than Mr. Eden? Are their personalities likely to change so much that an outsider would think one was the other? Are the differences between the Falstaffs and the Hamlets of this world really temporary and evanescent? There is obviously a need for a large scale investigation into the influence of different situations on personality test scores, but it cannot reasonably be doubted that there is some constancy underlying the diversity in human behaviour. It is the task of this branch of psychology to reveal these constancies and to find their limits.

Last and least, it has been claimed that trait theories are a poor working philosophy for those who are attempting to alter behaviour, if it is true that traits are conceived as relatively inflexible characteristics of the person. However, the aim of science is not to provide comforting philosophies but to reveal the facts. The educator, the social worker, and all those concerned with the amelioration of society, would no doubt prefer the human personality to be entirely flexible, but researches carried out so far by Eysenck, Cattell *et al*, and Vandenberg in the University of Michigan twin study, in which genetic factors have been systematically studied, e.g., in identical twins separated at birth, strongly suggest that personality variables, like intelligence test scores, are partly, though by no means entirely, defined by innate rather than by environmental influences; i.e., we are born with a predisposition towards neuroticism or extraversion, and our personality depends as much on our parentage as on our environment. It must be emphasised, however, that this is true only of personality differences within our own culture. Environmental differences could conceivably be so great, e.g., between normal conditions and continuous severe pain, that similarities in personality structure, even in identical twins, would vanish. Anyone who can look back over a lifetime and recall the personalities of his friends over the years will agree that they show a great deal of constancy, although whether this is due to genetic or environmental factors can only be decided by the systematic study of genetic influences.

Inferential validity

This type of validity is concerned with whether research results are logical and fit into a coherent scheme or chain of reasoning. For example, Eysenck has developed the theory that introverts should condition more rapidly and for a longer interval of time than extraverts. Perhaps the introvert, with his concern with the reactions and beliefs of other people, can be assumed to be strongly conditioned by his social environment, whereas the extravert, with his outgoing self-confidence and his ignorance of what people think of him, can be held to be less conditioned. In the majority of experiments the tendency has clearly been in this direction although in some researches the correlations have been reversed. Franks carried out a research with sixty normal male students using the eyeblink reflex. It was found (1) that those students who were introverted conditioned considerably better than those who were extraverted and (2) that there was no correlation between conditioning and neuroticism. Very little work has so far been carried out in this field with children, but Hallworth was unable to confirm Eysenck's identification of introversion with a higher rate of conditioning and neuroticism with autonomic drive. A large amount of research is currently being carried out on this problem, with the results mostly, although by no means invariably, supporting Eysenck's hypothesis. Another theory that has frequently been verified is that anxious people perform better than normals on easy tasks, since they have more desire to succeed, but that as the task becomes difficult the reverse is the case, since the additional difficulty puts the anxious subjects off their stroke. In general, tasks of medium difficulty arouse the greatest anxiety; easy tasks causing less anxiety because the subject knows that he will probably be able to perform them satisfactorily, and difficult tasks arousing less anxiety because only the most talented members of the group can be expected to be successful.

Factorial validity

Factor analysis is a method of analysing the correlation between tests in order to reveal the major underlying dimensions. It is best thought of as a method of summarising the overall relationship between complex patterns of inter-test correlations. The task of comparing (say) the fact that scores for extraversion in Test A are closely related to those on Test B, less closely related to Test C, negatively related to Test D, although Tests C and D are positively related, etc., etc., etc., etc., throughout the thousands of comparisons involved in a large series of tests, is beyond the powers of human intelligence, although well within the compass of statistical method. For example, we can compare the scores for the same variables from tests, ratings and questionnaires and discover the extent to which they are measuring the same thing. Cattell and Eysenck have used this method extensively in an attempt to group tests into their basic dimensions, in the same way as a factor analysis will group tests of arithmetic and English separately. We may begin with a simple example, based on similar validation methods, but too small actually to require factor analysis. Kay studied the relationship between an objective test and questionnaire scores. The test was a shove halfpenny board with four divisions, numbered '1' to '4', '4' being farthest from the subject. The task was to obtain a maximum score in a given time, and the difficulty for the subject was that too much ambition would result in the halfpenny being knocked off the end of the board altogether. Scores were correlated with Cattell's questionnaire factor as follows:

	Anxiety (Cattell Questionnaire)	Extraversion (Cattell Questionnaire)
No. of '1's (safety play) . .	−.126	−.261
No. of '4's (risky play) . .	+.183	+.235
Total Score	+.360	+.340

i.e., the stable and the introverted go for the safe end of the board, i.e., '1's, whereas the anxious and the extraverted try to knock up a high score by taking risks and aiming at the far end of the board, i.e., they try for '4's. In factorial terms, shove halfpenny score is loaded in anxiety and extraversion. A full factor analysis of 111 tests (say) would classify large numbers of such tests together, taking into account not only their 222 correlations with anxiety and extraversion questionnaires, *but also their* 6105 *correlations with one another.* Ballham gave 103 secondary modern school children, aged 12-15 Cattell's 'High School Personality Questionnaire' and correlated this with tests of intelligence and school marks in English and Arithmetic. The results of his factor analysis were:

	Factor I	Factor II
Mental Arithmetic ..	78	12
Mechanical Arithmetic ..	77	00
Problem Arithmetic ..	81	03
Arithmetic Total	89	09
Essay	40	63
Grammar	51	57
Reading	41	53
Writing	10	68
Dictation	43	61
English Total	43	74
Intelligence	56	03
Stability	41	12
Extraversion	08	23

Factor I is high in intelligence and all school subjects (particularly Arithmetic) and in Stability. Factor II is high on English subjects but is low on Arithmetic and Intelligence, and low on Stability but moderate on Extraversion. These results suggest the possibility that stability is a factor in all scholastic success, and that extraversion with its outgoing quality may make an additional small contribution to attainment in English.

The main contribution made to psychology by factorial studies of objective personality testing may prove to lie not so much in the field of individual difference as in providing an objective and comprehensive taxonomy of temperamental traits. In Cattell's work a clear distinction is drawn, for example, between Anxiety and Neuroticism, both defined in terms of a large number of test measures, Anxiety being characterised primarily by instability, i.e., by movability, showing as cork-in-a-storm flappability, lack of security, high fluctuations of view and performance, extreme views, shifts of opinion after suggestion, annoyability and emotionality under stress. Neuroticism, on the other hand, in Cattell's terms, is the stillness of exhaustion, appearing as rigidity, poor endurance, poor mental performance and much carefulness. The anxious person is tense, a floor pacer, whereas the neurotic is weary and overburdened, too tired to stand up. Similarly, the extravert is clearly defined as fluent about his own characteristics, dreams, etc., self-satisfied, with little shifting to the views held by successful people or away from those held by neurotics, and a tendency to recollect things he agrees with and to forget things he disagrees with. He is confident in his own future progress and finds no difficulty in passing social judgements on others. He is self-centred, self-satisfied and blissfully unaware of what others think of him. Again, 'psychotism' has been denotatively defined as showing poor performance of all sorts, such as, reaction times, tapping, arithmetic and reading, combined with little confidence and a general indecisiveness, dreaminess and impractical unco-operativeness in everyday affairs. Nevertheless, the psychotic shows a vivid power of imagery, with fast and accurate Gestalt closure and a bizarre quality in his creative work, drawings, and perceptual reactions.

Concurrent validity

Concurrent validity is the ability of a test to discriminate between currently existing groups, e.g., convicts who have returned to prison *versus* those who have not done so, members of professional groups, etc. This type of validity is similar in the psychological and statistical sense to predictive validity. It could reasonably be called postdictive validity. Illustrative examples given below are based on differences between occupational groups, psychiatric classifications, secondary modern *vs.* grammar school pupils, urban *vs.* rural children, British *vs.* American University students and Jewish *vs.* non-Jewish children. An example of the use of concurrent validity is to see whether test scores correlate according to expectation in various occupational groups. For example, one expects motor car salesmen, film stars and policemen to be more extraverted than research scientists and nuns. If the scores on personality questionnaires or tests designed to measure extraversion were not in this direction it would cast serious doubts on their validity. Similarly, sensitivity seems more appropriate to poets than to peasants, and more independence is expected of a bandit, the president of a University or an atomic physicist than of a chauffeur or a private soldier. Cattell's profiles for various occupational groups, can be grouped according to two second order factors (1) Stability, (2) Extraversion. We find that for Extraversion the highest scores are those by salesmen, University students (American), firemen, teachers, policemen, airmen and athletes (Olympic champions). The lowest scores are by clerks and researchers. The highest scores for Independence are by airmen, research workers and higher grade clerks, and the lowest by priests, clerks (filing, typing, etc.), cooks and kitchen helps. These are satisfactory results, unlike those for Stability, in which the highest scores were obtained by salesmen, University administrators, garage mechanics and electricians, and the lowest scores by editorial workers, high grade clerks and waitresses.

Similarly, in another study based on concurrent validity differences between clinical groups were studied with the following results: (i) Neurotics, Anxiety-Reaction and Depressive Reaction and Obsessive Compulsion groups show much anxiety, and high introversion, (ii) Psychopaths (persistent criminals)—show anxiety, combined with high extraversion, (iii) patients with Conversion Reactions (physical symptoms) and Psychosomatic disorders show anxiety only, (iv) Psychotics—fail to give any direction.

Hallworth studied concurrent validity in respect of differences between secondary modern and secondary grammar pupils. He defined anxiety in terms of eight self-rating questionnaires. These were used in twelve single-sex secondary modern and grammar schools where he obtained a sample of approximately nine hundred children, divided equally into eight groups according to age, sex and school type. Differences between the mean scores for anxiety of secondary modern and grammar school groups were tested for statistical significance. He concluded that, on the whole, secondary modern children show more anxiety than grammar school children. The secondary modern groups had significantly higher mean scores on three tests of anxiety, and higher mean scores on a test of emotional introversion. The secondary grammar school groups had significantly higher mean scores on two tests of social introversion, and higher mean scores on a test of self-blame and on a test of thinking introversion.

Butcher and Gorsuch using Cattell's questionnaires examined differences between urban and rural children. They found that in the case of six primary personality factors, urban children score in the 'anxious' direction as compared with the rural children. This seems to be in line with the fairly general belief that children are happier and more carefree when brought up in the country. Observations of this kind are common enough in literature and in general conversation, but they have previously lacked scientific support. Cattell and Warburton have compared the questionnaire responses of Manchester and Birmingham students with Illinois students. On the second order factors the American students were more neurotic, extraverted, conservative and tough-minded, whereas the British were more stable, introverted, radical and tender-minded. Kay studied Jewish *vs.* non-Jewish differences by carrying out an investigation into the test scores obtained for extraversion and anxiety by a group of Jewish boys and a group of non-Jewish boys. The scores for extraversion were Cattell's H.S.P.Q. (High School) Questionnaire and objective tests of reminiscence, time estimation, and figural after-effect. Tests for anxiety were Cattell's H.S.P.Q. and objective tests of leg persistence and shove halfpenny. The findings showed that the Jewish boys were more anxious than the non-Jewish boys.

If people are classified as above average in the major personality factors neuroticism-stability (N–S) and introversion-extraversion (I–E) we have 4 major groups, (1) stable introverts (SI), (2) unstable introverts (NI), (3) stable extraverts (SE) and (4) unstable extraverts (NE). An interesting preliminary research would be to pick out people who represent the *extremes* of these four groups and to study their general characteristics. Burt has carried out a research into their artistic preferences and comes to the following tentative conclusions: unstable extraverts like romantic, emotional and dramatic productions with strong human interest, e.g., Titian, Van Gogh, Matisse, and Rubens, the Venetian School, Delacroix, flamboyant Gothic and Baroque architecture, Wagner and Strauss, Byron and Shakespeare, Hugo, Browning.

Stable extraverts like more objective and realistic art, for the associations it arouses rather than the emotions, e.g., Raphael, the Florentine School, Handel and Verdi, Johnson and Macaulay, Swift, Gibbon, Dryden.

Unstable introverts like mystical and impressionistic art, e.g., El Greco and Blake, early Gothic, Debussy and Chopin, Delius, Shelley and Keats, Spenser, Coleridge, Monet, Botticelli, Burne-Jones, Rossetti.

Stable introverts like intellectual and formal productions, Holbein, Velasquez, Van Eyck, Vermeer and Cezanne, Bach, Wordsworth and Henry James, Arnold, Pater.

The above examples all illustrate the use of concurrent validity. This type of validity is more commonly found in personality studies than in investigations of ability. In ability tests our chief concern is usually with the prediction of future performance and people are placed in order of merit. In the personality field, however, people form themselves into various occupational groups, which differ from one another in quality rather than in merit. Similar researches could also be carried out, e.g., on the groups people form themselves into according to their leisure activities, e.g., fishing, riding, Salvation Army, drinking. It will be seen from the above survey, that on the whole, the concurrent validities reported in the literature have been reasonably in accord with theoretical expectations. If they were the other way round, serious doubts would be cast on the validity of the tests, e.g., if neurotics were stable or Americans introverted. At this early stage of research into personality traits we often have no *a priori* grounds for validating the results, e.g., we do not yet know the direction of the relationship between anxiety and scholastic attainment. Anxiety may conceivably be either a spur or a handicap to students of different ages in different circumstances, (but the trend in work carried out during the last six months suggests that, in most instances, stability rather than anxiety is the positive factor.)

Predictive validity

(*a*) *The relationship between anxiety and scholastic attainment*

A summary of work carried out in the United States in 30 studies of the relationship between anxiety and school achievement, shows the following results:

Anxiety vs. school achievement	*No. of results*
Significant negative correlation	13
Non-significant negative correlation	15
Zero correlation	1
Significant positive correlation	1

i.e., in 93% of the studies anxiety is related to poor achievement, stability is related to good achievement. However, Furneaux provides an exception to this rule, since he has shown that British students who do well at the University score more highly on neuroticism. Lynn has also found a positive correlation between anxiety and attainment in Advanced Level examinations, and that university students score more highly in neuroticism than other young people.

The finding that university students score significantly more highly on neuroticism than normal groups is perhaps surprising in view of Terman's widely accepted finding that highly talented young Americans are better adjusted than the normal population, and is contrary to the findings in the large majority of researches. Possibly neuroticism has two different effects on attainment, a disorganising one on learning and performance in stress situations but a facilitating one in so far as it motivates sustained work. Further, the bulk of research suggests that at the educational levels of the university and school sixth form, its disorganising effects seem to be more than compensated for by its motivating powers.

Warburton and Hadley studied students in training college courses at Manchester University and the State Teachers' College, Indiana, respectively, with a total population of 300 students. Holmes studied 350 college undergraduates at Illinois Wesleyan University. 1300 servicemen in the United States Navy and Royal Australian Air Force have also been tested. The overall findings from these researches clearly associate scholastic achievement with stability, and in particular with the primary factors of perseverance (G+) and will-control (Q_3+). In only one research out of six was anxiety associated with success, namely in groups taking training courses in the services.

Ballham, studying 103 secondary modern school children found no support for Lynn's theory that the anxious introvert had superior academic achievement. In fact, the more stable boys had significantly higher scores in both English and Arithmetic tests.

On the whole, G+ (perseverance) had the highest correlation with scholastic performance, a finding that has been replicated in several researches. Hallworth's results with secondary modern and secondary school children were also in the direction of a positive correlation between stability and scholastic attainment. A study by Astington had as its origin the observation that over 40 per cent of grammar school candidates for the G.C.E. of the N.U.J.M.B. pass in fewer than three subjects. The hypothesis was considered that this unsatisfactory position might be improved by taking into account in 11+ selection those personality qualities which make for academic success. In 1953-4 and 1954-5 about 300 boys in five primary schools in a county borough were rated by their class teachers for persistence, independence, dominance, interest, nervousness and emotional stability. Some 700 boys in the maintained boys' grammar school in the same town were assessed in the same six qualities by the ratings of three teachers, classmates' ratings and a questionnaire; in addition, introversion-extraversion and sociability were assessed by the questionnaire and sociability also by classmates' ratings. At all levels successful boys received significantly higher ratings than unsuccessful boys for persistence, independence and interest (i.e., stability); whereas dominance (extraversion?) seemed to have no consistent connection with academic achievement. Grammar school teachers' ratings of persistence, independence and interest showed an average correlation of about .60 with performance in internal school examinations and with G.C.E. achievement. Ratings made in the second year of the grammar school predicted G.C.E. performance better than I.Q. but less well than second-year examination performance. Primary school teachers' ratings of persistence, independence and interest showed an initially low correlation which increased with time with the boys' subsequent grammar school achievement. These personality ratings showed higher correlations with G.C.E. performance five years later than did I.Q. but were less good predictors than total performance in the 11+ examination. On this evidence the author draws the conclusion that the use of such ratings might be considered as an element in 11+ selection, but that they ought not to be used as a substitute for the 11+ examination. On the whole, the trend of this enquiry is to show a positive relationship between stability and attainment. A similar investigation by Crane arose from observations made by primary school teachers. They thought that if it were possible to take into account children's powers of 'sticking at a task' this would enable a more accurate prediction to be made as to the type of secondary education for which the children were most fitted. A preliminary investigation was carried out with 100 children aged 9 to 11 years. Scores for nine tests designed to measure persistence and three ratings on persistence were obtained, three of the tests using verbal material, three using numerical and three using spatial material. Factor analysis established a more general factor of persistence. From the twelve persistence measures used in this pilot study, three were chosen, a word building test, a number square test and a teacher's rating on persistence. Scores on these three persistence measures were obtained for 560 children in their last year in the primary school. Fourteen primary schools co-operated so that the children represented a reasonable cross-section of the community, unselected except for age. Two criteria of success were used:

(1) The orders of merit at the end of the first year in the grammar school.

(2) A composite scale from ratings by head teachers of both grammar and modern schools.

The conclusions were that: (i) the persistence rating would appear to predict success in the grammar school at least as well as does the Arithmetic test; (ii) the persistence tests failed on all occasions to improve significantly prediction by the existing battery of selection tests. There was positive correlation between persistence (stability?) and attainment, but it did not significantly improve upon existing tests, i.e., it might be due to 'halo effects'. (On the other hand, it must be remembered that if we had proceeded the other way round and had begun with the measures of persistence and then added attainment tests, the latter might have failed to improve upon the persistence ratings, i.e., when we are considering the addition of fresh tests to a battery, it is a matter of diminishing returns, the last comer nearly always comes off worst. A typical finding is that test E fails to add anything to tests A + B + C + D but that test A fails to add anything to tests B + C + D + E and so on).

On the whole, the weight of evidence suggests that anxiety is detrimental to academic achievement, particularly with younger children. The level of difficulty of the material and the stage of education reached may however be very important factors and the relationship may prove to be complex. Anxious persons tend to be relatively more efficient at easy tasks and less efficient at difficult tasks, i.e., anxiety is a spur to success when a person tackles a task within his competence, but it becomes a handicap when serious difficulties arise.

Lynn has followed up his finding of a correlation between anxiety and academic success by pointing out that the idea that schoolchildren ought to be happy is comparatively new. Tension and anxiety are bound to arise in a competitive system. The belief that in educating children we should free them from anxiety and tension is revolutionary. For many centuries education has been based on tension, but we now refer to the psychologically harmful effects of competitive striving. All frustration is, in his opinion, not bad; anxiety and fear are civilising forces, and it is only with their help that people can live in society at peace with their fellows. Complete adjustment, has, so Lynn thinks, its dangers. We should think more in terms of intermediate danger as the ideal state. He quotes Proust as saying, "All the greatest things we know have come to us from neurotics, it is they and only they who have founded religions and created great works of art". The gist of his argument is thus that anxiety aroused by competitive striving in education stimulates the children to effort and may not be entirely harmful. Child has replied to the effect that a child who is worried or anxious can seldom if ever use his capacities to the full, and Hemming considers that, "Neurosis is an unfortunate by-product of genius, not its cause". In response to these criticisms, Lynn has replied that there are different degrees and different kinds of anxiety. He agrees that intense anxiety may have an inhibiting effect on school work, but he thinks it is extremely rare for anxiety about school work to be so intense. In his view, a child's happiness centres on his parents, not the school. The relationship between anxiety and success at school is of great importance, and we shall know a great deal more about it when we have efficient agreed measures of anxiety. But the balance of research results as we have seen above, and the whole weight of clinical experience links anxiety with poor achievement (and with misery).

(*b*) *The relationship between anxiety, arithmetic and reading*

With regard to differences between attainment in reading and arithmetic, Lynn has pointed out the child who is good at reading, but poor at arithmetic is generally recognised as odd. This is possibly because arithmetic requires attention to the teacher and the capacity to work at an uninteresting task, thus handicapping the anxious child; whereas reading is acquired at home and in ordinary social life. There is some evidence that neurotic children tend to be better at reading and that psychopaths are better at arithmetic than reading. Lynn suggests that the simplest explanation of the link between anxiety and reading attainment is that the highly anxious devotes a great deal of time to solitary reading, while the unanxious child is engaged in some more active pursuit. A similar explanation to account for the sex difference in favour of girls in reading attainment has been put forward by Burt, who draws attention to the sedentary habits of the little girl, sitting at home reading while her brothers are out to play. Many writers have noticed that the anxious solitary child may become an avid reader to satisfy his needs in fantasy, as an escape from the real world, or simply from the ambition for success which often characterises anxious children. It seems less likely that anxious children will get pleasure from doing arithmetic, on which anxiety may well have a disorganising effect, as Burt observed. Also, there is considerable experimental evidence that anxiety impedes the acquisition of complex skills, and arithmetic, for the school child, is undoubtedly a complex skill. In Burt's view children who are anxious tend to be better at reading than at arithmetic. Speaking of anxious children, he writes: "With most, however, it is arithmetic that offers the severest trials." They would readily echo the sentiments of Marjorie, the seven year old friend of Sir Walter Scott, "I am going to tell you the trouble and wretched plague that my multiplication gives me. You can't conceive it. The most Devilish thing is 8 times 8, 7 times 7 is what Nature itself can't endure". Jastak writes that high reading and low arithmetic scores tend to occur in abnormal mental states of developmental nature and of long standing as in neurosis and schizophrenia. Both Chase and Feinberg report that juvenile delinquents are better at reading than arithmetic. Himmelweit and Petrie found that obsessional and anxiety neurotics have a high verbal ability in relation to their performance intelligence. Lynn gave Himmelweit and Petrie's projection test to 45 normal boys attending a secondary modern school, all boys due to leave school at the end of the term in which testing took place, and found a relationship between anxiety and relative superiority in reading compared with arithmetic. Thus, there would appear to be a fairly well established association between anxiety and relatively poor arithmetical performance.

Lunzer has disputed these findings, but as his findings are based on ratings for aggression and withdrawal, whose relationship with measures of anxiety is unknown, no direct comparison may be made. His work does suggest however, that differences between arithmetic and reading attainment may also depend on the factor of carelessness, and that this will play different parts at different stages in the child's development. He says that "The comparative difficulty of subjects is affected not only by the specific experience of children (teaching skill, absences, etc.), but also by the standard which they have attained in each. Thus, where the mechanics of reading have not been mastered, there is every reason to believe that the learning of reading is at least as complex a task as the learning of arithmetic. At a somewhat more advanced level, both skills may show a high component of mere mechanical repetition but performance in arithmetic is more liable to errors of carelessness. Finally, at the secondary level we may find that skill in mathematics demands a certain elasticity of approach and flexibility of reasoning which are impaired by blockages due to anxiety. But, whatever the level, individual differences will be important, since the experience of success is the all-important factor in the acquisition of skills." Thus, the relationship between personality traits and scholastic performance in certain school subjects may well change with the age of the child.

(*c*) *The relationship between extraversion and scholastic attainment*

The second major personality factor, extraversion, is more often reported to show a negative relationship with scholastic attainment, as in the work described above of Warburton and Hadley, Holmes, and Lynn. A further corroborative study of the introversion-extraversion finding has been reported by Broadbent. Students graduating at Cambridge were divided into those obtaining good and poor degrees, and their level of extraversion assessed. This test showed that students who do well are significantly more introverted than those who do badly. However, the association between this factor and achievement may partly depend on the academic subject studied, extraversion possibly being linked with Arts subjects and introversion with scientific and technological subjects. There is also some suggestion in work carried out at the University of Illinois that musical aptitude is related to extraversion rather than introversion. This is an interesting finding, since a similar relationship is sometimes found with literary studies. Warburton found a small correlation between the results of the questionnaire on extraversion and 'membership of the Arts Faculty' among British University students, Ballham found a factorial relationship between English ability and extraversion with secondary school children, and Pritchard between extraversion and ability at spoken French. He undertook an investigation into the relationship between specific types of personality and the successful acquiring of a foreign language. In this research, the subjects were a class of 32 'A' stream boys in a large London grammar school. It was decided to concentrate upon an examination of a possible connection between sociability and spoken fluency in French. The latter was measured by the time during which the subjects spoke understandable French in answer to a number of simple questions, pronunciation and grammatical errors being disregarded. The attempt to measure sociability was made by taking time samplings of observed social behaviour in the relatively uncontrolled situation of the playground during breaks. Although the sample was too small for definite conclusions to be drawn, the statistical results and a subjective examination of the group, pointed to the existence of a connection between sociability(extraversion) and fluency in spoken French as learnt in school as a foreign language, the correlation being .85 with the staff ratings for sociability, and .51 with the time samplings on sociability. This research thus suggests an association, which has been found in other studies, between extraversion and ability at languages. Perhaps extraverts have the panache needed in literary pursuits. Finally, Butcher and Gorsuch have put forward the interesting hypothesis that up to a certain age, or a certain educational level, cyclothyme (extravert) students achieve more, only to drop back later relative to the more reserved and withdrawn schizothymes. There is some support for this hypothesis in the work of Furneaux, who puts forward the view that extraversion begins to have a detrimental effect on educational attainment only at the University level.

The use of personality assessment in schools

To what use may the assessment of personality traits be put in schools? The three main methods of assessment are ratings, questionnaires and tests, and the three main fields of application are in (1) *guidance*, including the treatment of delinquents, disturbed, backward and possibly forward children, who are ahead of their peers in school work but who are not necessarily in advance in emotional adjustment, (2) *selection*, chiefly at 11+ and 18+, and (3) *research*, into the practical fields of selection and guidance and into the theoretical problems of general psychology, concerning the nature of personality, temperament and character. The value of ratings is unfortunately diluted by 'halo effects', i.e., the difficulty of disentangling in the rater's mind the related factors of personality and scholastic attainment. Nevertheless, precautions can be taken by the methods described above to minimise these effects, and statistical techniques can be employed to separate out to some extent the discrete influence of academic performance and personality assessments from the teachers' overall grades. There is no doubt that teachers' ratings of their pupils are of great value to educational psychologists. The classroom teacher, particularly if he sees his children very frequently (as most infants' and primary teachers do) has the advantage of a long term acquaintance with his class, of being able to compare them with one another in a way in which a psychologist or a parent obviously cannot, and he is able to bring professional expertise into the task of assessing the children's capacities. In practice, teachers' ratings are used both in guidance and in selection in the guise of confidential reports to child guidance clinics, education officers, headmasters, etc., also as teachers' assessments of suitability for grammar school or University education, and as testimonials and references for posts. In attempting to introduce standardised ratings into education, psychologists are simply bringing them closer to our knowledge of the psychological background of personality structure.

Questionnaires suffer chiefly from the drawback of being fakable. This is a less important consideration in the case of younger children who are less sophisticated than secondary school pupils. Questionnaires also have the drawback in an introverted culture such as the British, that personality questionnaires seem to many people to be an intrusion into their private life. Personality questionnaires are therefore not likely to be popular with local education authorities, industrial organisations, the forces and so on. (Nevertheless, the author finds that when he lectures on this topic, the audience usually sets up a clamour to have their 'personalities tested'). For purposes of guidance, whether educational or psychiatric, it is in a person's own interest to answer a questionnaire accurately, and there is not likely to be any objection to their use, but in selection tests and examinations in which the subject wishes to show himself in a favourable light, questionnaires are obviously less suitable although certain devices can be built into them to reduce faking. There is little doubt that questionnaires of the future will be more sophisticated in design and more obscure in intention.

Objective tests should prove invaluable, chiefly because of their objectivity. They do not seem likely to be used in selection until their validity has been thoroughly substantiated and before responsible authorities and the public are convinced of their fairness. Nevertheless, personality does play a part in occupational success, its role is in some measure consistent and predictable, and reliable means for assessing this will eventually be devised and used in the interests of the individual and the community. Who could have foreseen in 1900 that most of the British nation in 1950 would have their occupation, either in times of war or peace, partly determined by pencil and paper tests of intelligence.

For purposes of research, all methods of personality assessment are invaluable, and in the future, educational institutions will no doubt play a major part in making the development of this branch of psychology possible, as they have done in the past with their assistance in the study of individual differences in the fields of ability and attainment. But, on the whole, the failure of educational psychologists to extend standardised mental tests into the personality field seems quite remarkable. Would it be ridiculous, for example, to stream children for stability as well as ability? Nearly every research that has been carried out in education in the past has assumed, in effect, that all children are equally anxious, equally introverted, and equally persistent, despite our personal knowledge that temperamental factors are of the utmost importance in achievement. It would scarcely be more cyclopic to assume that all children are equally intelligent.

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A CRITICAL ANALYSIS OF RESEARCH ON THE EFFECTS OF CO-EDUCATION ON ACADEMIC ATTAINMENT IN GRAMMAR SCHOOLS—I.

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DISCUSSIONS on the faults and merits of co-education in the grammar schools are usually coloured by emotional bias, partly because of ego-involvement, partly because of the lack of facts. This article attempts to provide sufficient facts in one aspect of the problem to enable the debate to proceed on a higher level. What it does not do is to make any attempt to decide which system tends to produce the better education, in the widest sense of that word. For attainment is of course only a part of education, and not the most important part. Yet though for practical reasons we may attempt to study one part of education in isolation, as in this article, the influence of the remaining aspects cannot be excluded. For example the close interaction between intellectual ability and emotional attitudes, occasionally dramatic, normally quiet but pervasive, produces certain standards of academic attainment; it also tends to produce various degrees of adjustment and maladjustment.

Almost all the research which has been done on the effects of co-education on academic attainment has taken as criterion the examination results of pupils taking the first external examination, now the Ordinary Level of the General Certificate of Education. This is a ready-to-use measuring rod which is reasonably accurate for the comparison of large groups of pupils. Provided we have the services of a computer operator we can easily compare the average marks of co-educated pupils with the average marks of pupils in girls' or boys' schools. It is by no means easy, however, to assess the reasons for the differences. Many popular suppositions about the comparative standards have no foundation in fact. For example there is a belief that, since the direct grant grammar schools and some of the better independent Public Schools have a high academic standard and are single-sex schools, therefore single-sex schooling *per se* produces higher academic attainment than co-educational schooling. As will be seen in this article there is no research evidence to support this belief. There are, however, so many factors which have a bearing on the academic level reached by groups of pupils that conclusions can be arrived at only after a most careful consideration of a number of researches. Such factors are age, social class, academic aptitude, number of subjects taken, comparative qualifications of teachers, and so on. None of the researchers had sufficient resources to plan an experiment in which these factors were kept reasonably constant, so that in discussing their findings we need to keep such variables very much in mind, even though occasionally the researchers themselves have failed to do this. This article now takes the researches in chronological order, subjects them to a critical analysis, and endeavours to arrive at findings from a general appraisal of the evidence.

The Tyson Survey

The first of the large-scale surveys was carried out by Tyson, working in the Department of Education, University of Manchester. He analysed the results of schools taking the School Certificate examination of the Northern Universities Joint Matriculation Board. Though some of the single-sex schools were Direct Grant and Independent, the great bulk of pupils came from day maintained grammar schools. There is also an appreciable sprinkling of co-educational schools in the northern towns, so that the two rival samples of single-sex and co-educational establishments are not as unequal in character as is the case under some Examination Boards. What difference there is between the samples would appear, by concensus of opinion, to give a slight start to the single-sex schools, but one would be more satisfied if there had been some attempt to determine the nature of the difference, or to select pairs of schools for the two samples. For such an early date, however, this is a valuable survey.

Tyson's criterion is the percentage of pupils reaching credit standard in each of nine subjects in 1925 and 1926. Contrary to popular expectation he finds that in almost all subjects boys in his mixed schools reach a higher average attainment than the boys in his boys' schools, the difference being statistically significant in seven subjects and for both years. In addition co-educated boys have a significant superiority in Latin for one year. French is exceptional, there being a significant difference in the opposite direction.

In the case of the girls the percentages of success are much closer together for the two types of school, but with the girls' schools in the lead. The significant differences in favour of girls' schools are in History (two years), Art (two years), English (one year) and Physics (one year), while for one year there were non-significant differences in the same direction in English, Latin and Physics, and for two years in Chemistry. Girls in mixed schools had significant superiorities in Mathematics (two years) and French (one year), a non-significant superiority for one year in French and Latin, and a negligible lead in German when three years were averaged.

A number of important variables, however, must be considered. Though the average ages of the boys' group are the same, the co-educated girls are three months younger than are all the girls combined, so that they must be four or five months younger than the girls in girls' schools. This represents a distinct handicap for the girls in mixed schools. Tyson also points out that a much greater proportion of the mixed schools are situated in relatively sparsely populated areas. This again would be expected to give the mixed schools a pupil intake less able than that of the city schools and probably of lower social class. The cities also tend to attract the better qualified teachers, and most of their grammar schools are single-sex.

Tyson in a later analysis tried to remove these effects by taking the results of only those schools where the density of population was 10 persons to the acre, or less. He did this for only six subjects. Co-educated boys then increased their lead in three subjects and their inferiority in French became non-significant. On the other hand their superiority in English was reduced below the statistical threshold, and in History the boys from single-sex schools even gained a small, though non-significant superiority.

There may, however, be an arithmetical slip in this English result, the amended figures being more favourable to the mixed schools.

When the girls' samples are limited to rural areas the change is in the same direction. The deficiency of the co-educated girls in English and Chemistry almost vanishes, and their lead in Mathematics and French is improved. Though History and Art move in the opposite direction, the discrepancy in History may again be due to a clerical error. In large scale surveys such as this a few errors are not surprising, and one should not on this account form a wrong impression of Tyson's work.

In rural schools the co-educated boys lead decisively in three subjects, have a negligible lead in one and a negligible deficiency in two, compared with segregated boys. The co-educated girls are superior in two subjects, inferior in two, have a negligible inferiority in one and an equality in the sixth, compared with segregated girls. This summary ignores the possible errors mentioned above.

There is still another variable to be considered. As the criterion is the percentage of candidates reaching credit standard the figures may be very misleading if one type of school presents most of its pupils for the examination in say Mathematics, and the other type presents only its better pupils. In fact the mixed schools presented 8 to 9 per cent more of their girls in mathematics than did the girls' schools. In Chemistry about half of the co-educated girls in rural schools took the examination, whereas only 16 per cent did so from rural girls' schools. In the large sample the difference was 14 per cent in 1926. In Physics 17.4 per cent of these co-educated girls sat, compared with only 4 per cent of the girls from girls' schools. The much more 'refined' selection of candidates in the girls' schools must have an appreciable effect on the comparative results. When we look at the boys' groups the percentages of pupils sitting for each subject tend to be much alike. In Latin, however, slight superiority of the co-educated boys might be due to their sending in 17 per cent fewer candidates. In Art, on the other hand, the decided superiority of the co-educated boys occurred in spite of an entry of 60 per cent compared with 30 to 25 per cent from the boys' schools.

The Crofts-Clark Survey

Clark, like Tyson, used the statistics of the Northern Universities Joint Matriculation Board, provided by the Secretary, J. M. Crofts. Clark was a research student in the Department of Education, University of Liverpool. His sample was also very large, consisting of 13,000 candidates from 142 boys', 180 girls' and 85 co-educational schools. Though he was principally concerned with the differences between the attainment level of boys and girls, he did compile a table which compared the percentages of successful candidates reaching matriculation standard in single-sex and co-educational schools. The figures are as follows:

Boys' schools	40.82%
Boys in mixed schools	42.64%
Girls' schools	38.27%
Girls in mixed schools	37.32%

It will be seen that the co-educational schools had a slight overall superiority. In assessing the importance of this we should keep in mind firstly the smallness of the difference, secondly that as in Tyson's survey the co-educational schools probably suffered from several handicaps which were not a necessary consequence of their organisation, thirdly that the amount of the measured differences is in part a consequence of the nature of the subjects which are included in the total. Though it might be said that these subjects comprise the grammar school curriculum, on what grounds should it be decided that mathematics for example shall count as three subjects or one? A fourth factor is the standard of the criterion adopted. If this were changed from credit to pass standard the measured boy-girl difference would be reversed; there would be little effect, however, on the comparison between segregated and co-educational schools.

The Survey of Gott and Walton

Both Gott and Walton, when Directors of Education for Middlesex, made a statistical comparison of the School Certificate marks of their county's co-educational, boys' and girls' grammar schools. Some of the details needed for a thorough appraisal of these surveys are unfortunately unobtainable, but sufficient is known for us to be able to make allowances for the gaps; the surveys then add considerably to the force of the general findings.

Gott examined the marks from 17 co-educational, 13 boys' and 10 girls' schools from 1921 to 1926 inclusive. At pass standard the co-educated girls were slightly superior, the crude averages over the six years being 63.7 per cent of successes for girls' schools and 65.5 per cent for co-educated girls. At credit level the co-educated girls had a marked superiority in all six years. To save space the crude overall averages are given, being 29.5 per cent for girls' schools and 37.9 per cent for the co-educated girls. In the boys' groups there was equality in the percentage of passes, but the co-educated boys were superior in five years out of six at the credit standard, and had a crude overall average of 51.3 per cent of credits, compared with 46 per cent for the segrated boys.

Walton, surveying the years 1929-33, confirmed this result in the case of the boys. The co-educated boys had a very slight superiority in the percentage of passes and were decisively superior in four out of the five years at the credit level, with differences ranging from 6 to 12.5 per cent of credits. The girls' groups, however, reversed their positions. Girls from girls' schools were somewhat superior in passes in four out of five years, the difference varying from 2 to 9 per cent. In credits they were also just in front, the crude averages for the five years being 40 per cent of credits in girls' schools and 39 per cent among co-educated girls. In three years out of five, however, the co-educated girls were in the lead at the honours level.

It cannot be too strongly emphasised that these are only raw figures. The lack of tests of statistical significance matters little in this context, firstly because the numbers are so large, and secondly because neither survey is made on a sample but on the whole relevant population of the county. We should, however, remember that the co-educational schools in Middlesex might well have suffered from some of the disabilities known to be present in other surveys, namely the younger age and less fine selection of the girl candidates, and the lower social class of the pupil entry. On the other hand the urban-rural variable would presumably exert much less influence here than in other areas.

The two surveys, however, present a problem. Why did the girls' schools improve their position in Walton's survey? One asks first of all whether the schools were selected on the same basis for both surveys, with Walton's merely adding newly-built schools. As the second survey was clearly intended as a comparison with the first, one presumes that this was the case, but the evidence is lacking. More likely factors are a gradual intensification in girls' schools of the finer selection of candidates, the gradual amelioration in favour of girls' schools of the regulations of the examination, and the effect on girls' schools of the knowledge that they appeared to be slightly behind on the first survey.

It will be noted that in both surveys, when the results of boys and girls are combined, the co-educational schools have an advantage. The anomalies may well have been due to some special feature of the schools chosen or indeed of Middlesex schools in general during this period†.

Field's Survey

A rather fuller comment on this survey will be given by the writer elsewhere. It was limited to 4 boys', 3 girls' and 3 co-educational schools in the Birmingham area, and was concerned mainly with sex differences in attainment rather than with co-education. Because of the unreliability of results from such a small sample her findings are not given here, but those who wish to look them up should note that Field did not discern that there were appreciable age differences between the segregated and co-educated girls, nor did she pay any attention to the incidence of the dropping of weak subjects. This research, however, is one of the few to indicate differences between the various types of school in the amount of time devoted to individual subjects, and the first to point out that the attainment of a pupil in mathematics is probably raised if that pupil also includes physics and chemistry in his or her studies.

King's Survey

King surveyed the results of the London General School Certificate examination for the year 1945. He could not, however, secure separate data for the two sexes in mixed schools. In the following table he shows the level of attainment in the three types of school in fifteen subjects, mathematics counting as three.

Attainment in London G.S. (Average numbers)

School	Subjects Taken	Failures	Passes	Credits	Very Good
Boys'	9.2	2.3	2.0	3.5	1.4
Girls'	8.6	1.7	2.1	3.8	1.0
Mixed	9.3	2.1	2.1	3.7	1.3

Readers will note that the results of the mixed schools fall between those of the boys' and girls' schools. Co-educated pupils take the biggest subject load. If credits and very goods are combined they have the highest number per pupil, though the lead is a small one, and may be said to be in part related to the number of subjects taken. Girls in girls' schools take fewer subjects, due partly though probably not entirely to a finer selection of candidates, particularly in mathematics.

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† Correspondence on this point, especially from those well acquainted with the schools of Middlesex, would be welcome.

Sorting the results in another way King finds that the co-educated pupils had more passes than boys' schools in 10 out of 15 subjects, more credits in 13 and were slightly better at the very good stage in 8 subjects. In comparison with girls' schools, co-educated pupils had more passes in 7 (*sic* or 6) subjects, more credits in only 3 subjects, and more very goods in 7. King pointed out that in the girls' schools only the better girls tended to offer physics; it should be added that this comment also applied to chemistry and to a lesser extent to mathematics. Any measured superiority of the girls' schools in any of these subjects is therefore quite spurious.

The general variables which have been mentioned in other researches apply probably more strongly in this one. A much greater proportion of the co-educational schools would be rural, whereas the London schools for example were at that time almost entirely single-sex. The metropolis, with its higher rate of pay, and its high percentage of famous schools, would tend to attract the more highly qualified and experienced teachers. But the chief reason why one should hesitate to give this enquiry equal weight with the others is that it was made when large numbers of men teachers were serving in the Forces. The girls' schools would be able to recruit staff much more easily than the boys' schools, with the co-educational coming somewhere in between. This factor had little or no effect on King's main enquiry which was not primarily concerned with co-education.

Sutherland's Survey

Sutherland analysed the results of single-sex and co-educational protestant grammar schools in the Northern Ireland Senior Certificate Examination in 1957. She used two criteria, firstly success in obtaining a Certificate, secondly the average mark in each principal subject.

Boys from co-educational schools were much more successful in gaining the Certificate than boys from boys' schools, but there was an even greater difference in the opposite direction when the girls' groups were compared. This finding is contrary to those of Tyson, Clark, Gott and Walton. Why should the N. Ireland result be an exception? When we examine Sutherland's results closely we find that in order to gain a Certificate a pupil must pass in English Language. As this is one of the four subjects in which boys' schools do better than co-educated boys, this superiority in the compulsory subject reduces the effect of their much greater deficiency in most other subjects. In the case of the girls' schools their lead in the one compulsory subject operates to increase an overall superiority which is actually much smaller than in the case of the boys, when results in individual subjects are taken as the criterion. An interesting point is that the lead of the co-educated girls in another key subject, mathematics, gives them no compensating advantage as this subject is not compulsory for the gaining of a certificate. Domestic Science or Biology may be taken instead of Mathematics.

Much more reliance may therefore be placed on the average marks obtained in each subject. As in all the other surveys the co-educated boys did appreciably better than the boys in boys' schools, with statistically significant leads in 7 out of 10 subjects, and a corresponding inferiority in only English Language. As found in other research the differences between the boys' groups are much larger than those between the girls' groups. The co-educated boys have more than a 5 per cent superiority in five subjects, but the segregated girls have a similar lead in only Biology, which Sutherland herself says may not be representative because only a few schools take it. The segregated girls do, however, have a statistically significant superiority in five out of twelve subjects.

As there are only 9 boys' schools in the sample, Sutherland rightly felt that the averages might be unduly influenced by the presence of one large school which, for fortuitous reasons, might be very good or very bad. She therefore used a more conservative test of significance, taking the averages in each subject for each school as the unit, and assessed whether the variability between the averages for individual schools was so great as to throw doubt on the significance of any difference apparently due to co-education. There remained only four subjects in which co-educated boys were significantly superior to boys from boys' schools. None of the differences in favour of girls from girls' schools remained significant.

Data which was unfortunately somewhat incomplete indicated that the groups were roughly equal in intelligence test score. While the boys' groups were of the same average age the co-educated girls were three months younger than the girls from girls' schools. Sutherland's data also shows that the pupils entering the co-educational schools are of somewhat lower social class than those entering the segregated schools. It is at this point that the interpretations of Sutherland and the writer diverge, after a large measure of agreement.

Age

The first difference of interpretation is whether the younger average age of the co-educated girls represents a handicap which might appreciably affect the results. Sutherland maintains that this would have little if any effect. When we examine the data, however, we find that this age difference is produced by 29 per cent of the co-educated girls taking a shorter five year course instead of the usual six years, while only some 12 per cent of girls in girls' schools took this shorter course. It seems to me that if the extra 17 per cent of these younger, and presumably better, co-educated girls had pursued their studies for the additional year they would have made an appreciable improvement and raised their group's averages. We must remember that the differences between the two girls' groups is only some 1 or 2 per cent for most subjects.

To support her argument Sutherland carried out correlations between age and attainment in all four groups. As she found they were negligible, she maintained that she had proved that age has no effect on attainment. If we carry this argument to extremes it is tantamount to saying that 10 year old pupils will do as well as 16 year old pupils, which is palpably untrue. Negligible correlations between age and attainment in any group do not in the least prove that age has no effect on the attainment of the individuals in that group. Let us consider, for example, the practice of school staffs in deciding on promotion for their pupils at the end of a school year. There is a tendency for individuals who are backward in their work to be kept down for an extra year, and for those who are doing very well to be allowed to take a shorter course. This process produces a situation where younger but abler pupils obtain marks not very different from those obtained by the older pupil who has taken a longer course. This would account for a lack of correlation between age and attainment, but it evidently does not mean that age has no effect on attainment.

Sutherland also compares the girls' samples by dividing them into age groups and calculating the average mark for each age group in each subject. She points out that there is still a tendency for the segregated girls to be superior in a majority of the age groups and claims that this again proves that the difference between the two girls' samples is not due to age. Three points need to be made in reply, two minor and one major. The minor ones are firstly that there will be an overlap in some of these rival age groups whereby a few co-educated girls who have done five year courses are being compared with segregated girls almost the same age who have done a six year course; secondly that in some subjects such as mathematics the girls from girls' schools are much more finely selected, that this boosts their average and is nothing to do with age. The co-educated girls took about 6.44 subjects each and the segregated girls 6.23. The major factor is that of social class. We already know that the segregated girls tend to be of rather higher social class, and that research has indicated that pupils in grammar schools do better on the average if they are of higher social class than if they are of a lower one. The slightly higher averages of the segregated girls found in a majority of the age groups might therefore be due to social class differences as well as to the other factors already indicated.

Social Class

Discussion on the effect of social class and its concomitants on the attainment level of pupils in grammar schools has deliberately been postponed to this moment because it is a point of contention in the interpretation of Sutherland's study. The argument is limited to the assessment of the girls' results because the findings about the boys are not under dispute.

Sutherland, while admitting that the social class composition of the co-educational schools is appreciably 'lower' than that of the single-sex schools, maintains that this will have little or no effect on the comparison in attainment. The extent of the social class difference is shown by calculating from Sutherland's figures the percentage belonging to the combined social classes one and two in the two types of school; in the girls' schools it is one third and in the co-educational schools 19 per cent. The difference is roughly reversed at the bottom end, again handicapping the co-educational schools.

In an attempt to prove her point Sutherland calculated the average mark obtained in each subject by the rival groups within each social class. As the girls' schools tended to be slightly superior in a majority of these social class groups she claimed to have produced the proof. Many an innocent and even many experienced researchers would have swallowed this whole, but they would be sadly wrong; for concealed in every 'social class' pigeon hole lies an age difference which penalises the co-educated girls. In addition, another factor which affects these averages is the finer selection of candidates in a few subjects by the girls' schools. For example, almost 90 per cent of the co-educated girls were presented in mathematics and only 73 per cent of segregated girls, giving the latter a flying start as they had naturally witheld a greater percentage of their weak pupils. We see then that Sutherland is far from proving her point as her social class tables are contaminated by the age and candidate selection factors.

Further, a detailed examination of these tables shows that in spite of other factors being present they do actually reveal a rough social class influence. The attainment rankings of the social class groups, calculated from the averages of the total marks for all subjects, are as follows:

Attainment Rank Order

Schools	*Social Class*							
	A	B	C	D	E	F	G	'Farmers'
Girls' ..	2	3	1	8	4	7	6	5
Co-educational	1	3	4	2	8	6	5	7

We would not expect a perfect progression from A to G for various reasons, though the size of the discrepancy between the D and E classes for the two samples seems inexplicable unless there has been a clerical transposition somewhere down the line from the raw data. We are chiefly interested, however, in the contrast between say the first two and last two classes, as this is where the two school groups differ most. Combining the two types of school we find that the average attainment ranking of social classes A and B together is 2.25 compared with an average ranking of 6 for the two lowest groups F and G.

Finally, other research has shown quite conclusively the effect of 'social class' on attainment in the grammar school. The Ministry's Early Leaving Report in Table 7 shows that while 54 per cent of the sons of the professional and only 11 per cent of those of the unskilled class were placed in the highest academic group in the grammar school, only 6 per cent of the sons of the professional and 24 per cent of those of the unskilled were placed in the lowest category—those who had completed a five year course without obtaining School Certificate or as many as three passes at Ordinary Level. Campbell (1952) made a case study of 'over-achievers' and 'under-achievers' and found that those pupils who made better progress had better home backgrounds with regard to culture and the attitude of the parents towards education. There is other evidence in support of these findings (see bibliography: Evans, Griffith, Jones).

Other Variables

Large differences between the two types of school in the incidence of premature leaving could affect the foregoing argument. Evidence is scanty and no researcher could be satisfied with it, but as far as it goes it shows only a small difference. The Early Leaving Report in Table 4 gives 20.2 per cent in girls' schools and 23.9 per cent for girls in co-educational schools in 1946; this can be discounted as it would still leave the girls' schools with a decided social class advantage. In the case of the boys the report is misleading, the figure of 40.1 per cent of premature leaving for co-educated boys being a clerical error; the true figure, calculated from the data, is 23.4 per cent. For boys' schools it is only 14.6. The difference is too great to be dismissed lightly but it is reduced when we allow for one eighth of the segregated boys being from direct grant schools where the percentage of premature leaving was only 8.3, and compare the samples used in the surveys where the proportion of direct grant schools is very much lower. We must however bear this difference in mind when assessing the evidence for the findings. Unfortunately we do not know whether premature leaving was very different in its incidence in the two types of school during the time of the earlier surveys. If any local authorities have any statistics which might bear on this point we should be very glad to have them.

The nature of the staffing of the schools is another variable about which evidence is lacking. The writer is at this moment endeavouring to collect some data, but the statistics are not yet finalised and will cover only a small part of the problem. It is generally agreed that co-educational schools are probably less well staffed than single-sex schools because they are often in rural areas and are newer foundations; almost none are direct grant. The position in mathematics and possibly the physical sciences may be exceptional as the co-educational schools have the choice of men as well as women. This of course is one of their advantages as co-educational schools. If the girls' schools appointed men to teach these subjects—as some of them are already doing—then they are taking a move in the direction of co-education. It is unlikely that this same factor handicaps the boys' schools.

Conclusions

One finding which is common to all the surveys is that the co-educated boys do better than the boys from boys' schools. This of course only happens when the scales are not too heavily weighted against the co-educational school. As far as we can tell the boys' schools in our samples had a social class advantage, were almost certainly better staffed, included a number of direct grant schools, and their pupils were slightly more selective in their choice of subjects. They seem also to have a smaller proportion of premature leavers which by making them less selective, might put them at a disadvantage in the kind of comparison we are making. On balance the co-educational schools are less favourably placed, so that one would tentatively attribute their superiority in attainment to some factor present in co-educational schooling as opposed to segregated schooling. Lack of space prevents further discussion of this effect. It seems clear, however, that it can no longer be said that a mixed school is bad for boys because the presence of girls distracts them from their work.

For girls the trend is not as clear. Apart from Gott's study, where co-educated girls were definitely superior, they were usually superficially slightly inferior, though the difference between the two girls groups was not as great as it was with the boys. The co-educated girls on the other hand were younger than their contemporaries from girls' schools, they dropped fewer weak subjects, were on the average of rather lower social class; they are probably also in most subjects taught by a less highly qualified staff, though the position may be different in mathematics and the physical sciences. In view of these factors and of the very small differences found between the two girls' groups, it can be said that there are no grounds whatsoever for the belief prevalent in some quarters that single-sex education for girls produces *per se* a higher standard of attainment than co-education. Finally we can see that when the results of the two sexes are combined the balance lies with the co-educational schools.

This article is about the 'average school'. There will be some co-educational schools where the attainment level is low, and some single-sex schools where it is very high. Let no one think that this study is even slightly critical of the dedicated work of Heads and staffs of single-sex schools. When one thinks of some of these individuals and the greatness of their service to the community one acknowledges yet again that the highest values lie not in statistics but in the spirit by which men and women serve. If this spirit be right the work is good.

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THE TEACHING OF ENGLISH LITERATURE IN SECONDARY SCHOOLS:

Part I—A Review of Research since 1945.

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1. Introduction

The purpose of this article is:—

1. to review research in the field of literature teaching published in this country since the war;
2. to discuss the relative poverty of objective evidence in this field and what appear to be the most promising areas for further investigation;
3. to provide a select list of references to the more important articles about literature teaching as a supplement to the author's bibliography published in *Educational Research*, June 1961.

2. Research and the Universities

Of all the higher degree theses in Education presented to universities in the British Isles, perhaps 15% are concerned with teaching method (*vide* Wiseman *et al.*). In some subjects, properly objective studies have been fairly numerous. In English, certain areas (such as the initial stages of learning to read and the marking of compositions) have received a good deal of attention while in others far less work has been done. The whole field of literature teaching is notable in this respect, and, because of the difficulty of applying acceptable objective methods, most of what has been written has tended to be descriptive rather than the reporting of what the Americans call "hard core" experimentation. There is plenty of informed opinion in print but very little valid quantitative and qualitative investigation.

Out of approximately 2,800 theses listed by Blackwell for the years 1949-1957 only a dozen at the most are directly concerned with literature teaching in the secondary school age range and another four appeared between 1945 and 1949 making a total of 14 in twelve years. During the same period rather more than twice that number of investigations indirectly relevant to the teaching of English literature were made, such as studies of leisure activities including reading habits and radio, television and cinema interests; studies of aesthetic appreciation and judgement based in part on literary material; attitudes to various school subjects, including English; studies of comprehension and readability, usually dealing with non-literary material; studies of children's creative writing; studies of teaching literature to other age groups such as primary school pupils and training college students; and studies of the English syllabus as a whole. All these studies are, perhaps, symptomatic of the growing realisation not only that literature teaching should not be treated as an isolated part of a fragmented English syllabus, but also that it must be looked at as part of the whole curriculum.

It remains true, however, that there has been a dearth of experimental work either centrally or peripherally concerned with the problems of literature teaching since the war. This is a matter for regret but hardly for surprise. Perhaps the reason why such investigations were rather more numerous in the inter-war years is that the difficulties involved were only then being discovered. This is reflected by the incautious titles of researches which would hardly get passed by a faculty board today. Surveying the field in 1937, Dorothy Bagley had to report rather apologetically that the main conclusions to be drawn from numerous researches were that "appreciation" of literature was a complex matter involving many elements none of which had been shown to be a factor in the mathematical sense, and that the development of literary taste and judgement was such a slow process that it was almost impossible to measure. It is not hard to imagine the comment of an English teacher on learning that much time and trouble had been expended to tell him this. Bagley's conclusion might equally appropriately have been written today, just twenty-five years later: "The lack of much definite information as to the psychology of composition and of the appreciative process, its development and training, is largely the result of the difficulty that exists in isolating the various elements of these complex processes and in holding other factors constant while we experiment with one variable in the situation". The poverty of objective information and the difficulties of obtaining it are still substantially the same.

In this field, as in all methodological research, the individual investigator is still at a grave disadvantage: the normal classroom must be his laboratory yet the conditions of school teaching and the higher degree regulations of universities make it virtually impossible to combine successfully and conscientiously the roles of teacher and researcher.

It seems certain that only large scale and long term co-operative research undertakings will provide any substantial enlightenment on literature teaching for the reasons Bagley saw. Although keen and competent manpower could probably be found, the field of literature teaching does not have the urgency or obvious practical usefulness in public estimation for financial support to be readily forthcoming. It would be gratifying if one or other of the large benevolent foundations were to espouse this cause and provide substantial support for a series of major enquiries. It seems probable, however, that only if the University Institutes of Education become able to take the initiative in contacting young teachers, particularly graduates, working in their areas and engaging them in research projects as a matter of course, will there be much more to report after another quarter century.

3. Research and the Journals

Writing about educational research in general, Schonell has said, "Few of the results of these numerous investigations have found their way into publication, and still less of the available material has been translated into a form in which it could influence, or be used by, the teachers in schools." One of the declared aims of this journal is to remedy this but no one, I imagine, would deny that a serious failure of communication still exists. Journals like the *British Journal of Educational Psychology* in which research is fully reported and discussed will be seen by very few secondary school English teachers, whereas periodicals with a much wider circulation in the school, and even a specialist journal like *The Use of English*, do not report and discuss the admittedly small amount of relevant research.

The preceding remarks are not intended in any way to deny the value of the kind of article that is published regularly in *The Use of English* and occasionally in journals aimed at a wider section of the teaching profession. Most of them are useful and stimulating discussions of aims and methods. The view which is sometimes expressed that descriptions of personally tested techniques of teaching or "useful lessons" are a source of danger to the cause they seek to serve in encouraging unintelligent imitation is surely mistaken. On the contrary, such descriptions encourage flexibility and fresh thinking where the *rigor mortis* of traditional routine is always too prevalent. The inexperienced teacher or student soon discovers that he has to make methods devised by another his own the hard way by trial and modification. Many of these articles on literature teaching in the less technical journals describe work, carried out by teachers in the course of their day-to-day contact with classes, which is experimental in a perfectly legitimate sense of the word. Some of it could not be assessed by acceptable objective methods but, particularly in a subject like literature teaching, it is most important that such work goes on and continues to be shared in print. Much of it, however, would be enhanced in value out of all proportion to the additional effort if its authors had an elementary knowledge of research techniques, or a little guidance in the initial planning and the statistical treatment of the results of their work.

The willingness to experiment with methods and texts certainly exists (particularly with non-G.C.E. age groups and streams) but it is not being used to the best advantage. Many teachers would be willing to help with collecting data for mass surveys or administering questionnaires, and the results of such surveys, particularly when they cover much larger samples of the school population than can usually be tackled by the individual investigator, can be of great interest and real value to the teachers themselves, to examining boards and librarians as well as to research workers using more sophisticated techniques. To take but one example, we know very little about the relative popularity of the traditional set plays and novels with children in the different sex, age and ability groups or the different appeals of much anthologised types of poem and of different methods of dealing with them in class.

In the subsequent sections of this paper I have attempted to refer to all the 'hard core' investigations which have been reported in this country since the war and to include a few of what seem to me the most substantial discussions of the various aspects of literature teaching. Many other articles not listed here are of more than ephemeral interest and for more exhaustive lists the reader should, of course, consult the *Education Index* and the first volume of the *British Education Index*, further volumes of which are eagerly awaited.

4. Literary Appreciation: General

A good deal of the most thoughtful discussion of the aims and effects of literature teaching in recent years has been conducted with the undergraduate student mainly in mind. It is evident, as I shall attempt to show in a subsequent article, that there is still a good deal of uncertainty about the most fundamental purposes of literary study, the benefits that are supposed to accrue from it and the kind of discipline it should involve.

The student of literature does not even know what to call himself, unlike the historian, the biologist and all his other colleagues. He is part linguist, part historian, part critic, part aesthete and frequently also aspires (or once aspired) to be a creator of the raw material of his study. Somewhere at the centre of his ideas about his "subject" is the notion of critical appreciation; he also has no doubt that the discipline of criticism begins and ends in delight. The day has passed, I believe, when any teacher would want to claim that a work of literature should ever be used as the relatively unimportant means to the end of scholarly discipline. All the other advantages of studying literature are seen to be secondary to and dependent upon delight, appreciation, enjoyment. This primacy of enjoyment in the teaching of literature at all stages means that attitude scales should be the most valuable tool for investigating the relative success of different teaching methods and the relative suitability of different works of literature at the various stages of education. If we fail to teach in such a way that pupils' attitudes to literature maintain a firm position at the favourable end of the continuum, it is fair to conclude that the results of our work are not merely nugatory but positively harmful and that we would be better advised to teach no literature than to go on confirming unfavourable attitudes. It is vital to remember in this connection that not only do abilities influence attitudes but that attitudes determine, in part, the functioning of abilities. Although there has been a distinct shift of interest from the cognitive side of learning to attitudes and interests in recent years, little of this work has been directly concerned with literature. Investigations by Walsh and Whitehead referred to elsewhere in this paper have shown, however, that there is no reason why the objective methods of attitude measurement devised by Thurston and Chave, and Likert, should not, with suitable modification, be effectively employed for this purpose, though the translation of percentage scores into standard deviation values needs some understanding.

Joan Richardson's article referred to below forcefully sums up the belief of many recent writers that, since children are capable of appreciation and sensitive interpretation long before they are capable of mature literary comment, the approach to literature should be through acting, speaking, listening and reading: nothing but insincerity and distaste are produced by forcing prematurely an ordered verbal response.

The brief report of Muriel M. Kay's examination of some of the psychological effects of teaching literature suggests a courageous attempt to validate some of the loftier and more nebulous claims made for its value in terms of personal maturity and development. It is to be hoped that more work will be done in this complex field though it may be doubted whether a satisfactory literary syllabus could or should be built along lines favoured in America and described by Sarah I. Roody, by deliberately choosing works which illustrate characteristic patterns of "well-adjusted living" and clarify for the pupil "the developmental tasks of youth."

5. Children's Reading: prose and school libraries

A good deal of work has been done in recent years to confirm and extend the findings of Jenkinson's pioneering survey, *What do Boys and Girls Read* (1940). We now have a fairly detailed picture of the leisure reading habits of secondary school pupils and the extent to which these habits are influenced by reading achievement, home background, sources of supply, the mass media and the guidance of teachers. Although it is important that this picture should be kept up to date, a more urgent need is for the available evidence to be brought together in some readily accessible form. It seems clear that if teachers are to extend their influence over children's leisure reading—perhaps the most important aim of literature teaching—they will have to find ways of narrowing the gulf that separates the books studied in school from the material voluntarily read by pupils. Such a suggestion need not raise fears of lowering standards in the English lesson. C. S. Lewis has said that a story that is enjoyed only by children is a bad children's book but mercifully there is no lack of material that can command the interest and respect of children and adults alike. Carsley has made a useful survey of methods of guiding children's reading and the most important factors which influence their choice of reading matter. He and other writers have stressed the very great importance of adequately stocked school libraries with facilities for home borrowing particularly in secondary modern schools. They have also confirmed Jenkinson's finding that boys' and girls' tastes are remarkably similar: the largest divergences between the sexes are in the reading of school stories, poetry and non-fiction but even here they are not so marked as is generally supposed.

M. D. Vernon's article is a useful discussion and review of research into speed, interest, comprehension and retention in silent reading though most of this work has been based on non-literary material. She emphasises what cannot be stressed too often, that acquiring the basic mechanics of reading is only the first step on the road to full literacy and that exploring, evaluating and relating what is read to the reader's existing ideas, attitudes and knowledge is an enormously complex process in which there should be a continuous development of skill. Black's classification of the difficulties of comprehension experienced by Training College students is another valuable reminder of the complexity of the process of comprehension. Failure to recognise the writer's intention and to detect irony were the most frequent stumbling blocks revealed by his enquiry which is useful in focussing attention on those features of prose communication where help from a teacher is most needed. Schonell has pointed out that in many schools there is a startling discrepancy between word recognition ages and comprehension reading ages which suggests that means are being mistaken for ends and that insufficient attention is being paid to directed and motivated silent reading. There is still a need for more reading and comprehension tests properly standardised for the 11-15 age range and based on modern curricula requirements. Greater use of such tests particularly in secondary modern schools could make the choice of suitable reading matter less of a hit or miss affair and so could the employment of one of the simple and objective methods for assessing readability, such as word frequency counts, which have been discussed in this journal by Nisbet.

It is regrettable that, in comparison to the amount of attention that has been paid to leisure reading, few enquiries have been concerned with books read as part of the English syllabus. Frank Whitehead's investigation of the attitudes of grammar school pupils to ten novels read in school is a most valuable exception. He found that four of the ten novels provoked such uniformly and strongly hostile attitudes that it is impossible to escape the conclusion that they should no longer feature in the syllabus. An extension of his work would undoubtedly produce equally clear-cut and important results. He also found that among the influences determining attitudes, those relating to the children themselves (e.g. age and sex of class, school environment, personality and methods of the teacher), were relatively unimportant when compared with those influences which are inherent in the books themselves. This finding contradicts the often expressed view that it doesn't matter much what books are chosen because a good teacher can get the children to like almost anything. Whitehead concludes, "Grammar School pupils of this age (11-16) prefer novels written in easy language, dealing with themes that are relatively immature emotionally, in which they find it easy to identify themselves with the hero or heroine, and in which the element of wish-fulfilment is comparatively open. The imaginative coherence of the novel has little importance for them." He also shows that the wide dispersion of attitude commonly found among pupils in the same class is a strong argument for replacing the single "class reader" by mixed sets of books.

Stewart, in an admirable discussion of the place of the novel in education, and other writers on the subject also tend, with remarkable unanimity, to agree with Jenkinson's by now famous conclusion that "a large supply of books and no teaching would produce similar or better results than our present system of much teaching based on few books, and that a rich supply of books chosen with the cunning derived from knowledge and foresight, together with occasional stimulus from the teacher would produce much better results." These conclusions which have obvious relevance for the organisers of school and class libraries and the 'O' level examiners as well as for the general selection and presentation of prose literature in class have been heeded all too little. The syllabus of set classics to be read aloud, wholly or in part, by the pupils in class is still the commonest method of approach in spite of the weight of evidence and informed opinion that such a procedure is doomed to failure if enjoyment and raising the standard of leisure reading are the criteria of success.

6. Poetry

The discovery, comparatively so recent, that children can create, not only in the visual arts but also in language, work which is valuable judged by mature aesthetic criteria has revolutionised the teaching of poetry as well as composition. The truth of the proposition that the surest road to the appreciation of an art is by practising it has gained wide acceptance more slowly in literature than in the other arts. Walsh has demonstrated that attitudes to poetry become markedly more favourable when activity is introduced into the poetry lesson through group composition of verse and choral reading, and Pym, Widdows, Langdon, Baldwin, the present writer and others have described techniques variously called "Free Writing" and "Intensive Writing" in which the reading and writing of verse are closely related and complementary activities. Richardson has also discussed the value of this kind of creative writing in helping to rehabilitate emotionally insecure children. The relative unpopularity with pupils of the more conventional poetry lesson as an element in the English syllabus has also been amply demonstrated by Jordan and others. Martin has provided evidence that 13-year-olds respond most favourably to humorous, exciting narrative and 'supernatural' poems and that boys' and girls' tastes are broadly similar in this respect. Descriptive poems are relatively unpopular though over 60% of the poems in some anthologies commonly used with this age group are mainly descriptive.

Britton has carried out an enquiry (in part an extension of earlier work by Eysenck) in which the ability of 221 raters to judge a group of 'true' and 'counterfeit' poems was tested. The 'true' poems were categorised as 'simple', 'complex', 'restrained in feeling' and 'abandoned in feeling'. Results showed that the more experienced raters tended to prefer the more complex and restrained poems. The less experienced tended to reject poems which they could not understand simply on the grounds of incomprehensibility while the more experienced were prepared to keep an open mind about 'difficult' poems. The primary obstacles to poetic judgement appeared to be the intervention of stock responses and preconceived ideas, attitudes and sentiments. When raters were retested after a period of from four to six months there was a significant improvement in their judgements from which Britton concludes that "poetry should be read and returned to", a point that teachers may sometimes forget.

Gunn has attempted to assess the influence of nine poetic qualities in the response of secondary school pupils and university students to nineteen poems. However, the circumstances of the enquiry and particularly the fact that the poems which the subjects scored were not read aloud, seriously detracts from the interest of his very tentative conclusions.

Eppel in a thorough investigation involving 600 subjects has devised an ingenious test of poetry discrimination which, like all good tests in literature, itself arouses interest and might well be used by other teachers. His conclusion is that analysis of those elements of sound, rhythm, imagery and meaning which go to making the total impression of a poem is a valuable aid to critical discrimination and this is in line with accepted practice particularly with older and more able pupils. It is salutary to be reminded that in our proper reaction against the old formal discipline of analysing poetry which depended on prosody, scansion, naming figures of speech, etc., we should not neglect the intellectual challenge provided by a more purposeful kind of analysis. The incompetence even of undergraduates in an honours school in simple comprehension of sense in poetry, not to mention evaluation, revealed by I. A. Richards should not be forgotten in a hurry. The work of Ogden and Richards has inspired Wynburne to argue most persuasively the virtues of vertical translation of both prose and poetry into basic English as a discipline for readers at all post-primary stages and to show how such exercises can give an insight into the structure of our language and a clear understanding of the elements of sense, feeling, tone and intention in the total meaning of verbal communication. There seems to have been a conspiracy of silence in educational circles about Wynburne's challenging book and it is to be hoped that we shall soon have reports of other teachers' experiments along the lines he suggests. More work on the difficulties children of various ages have in comprehending poems and attitude studies of their reactions to different poems and different methods of dealing with them in class would be of practical value to teachers. It is also to be hoped that further work in the difficult field of the development of values in adolescence will throw some light on how specifically aesthetic judgements emerge and are related to moral values.

7. Drama and Oral Work

There appears to have been little objective study of the methods and effects of drama teaching in secondary schools. Certain well defined trends in theory and practice are evident however. In the first place, the trend in the professional theatre away from the thorough-going realism of the picture-frame stage and the Theatre in the Round movement have been influential in the schools. Secondly, teachers like Peter Slade and Alan Garrard have been widely influential in promoting dance drama and other kinds of free and spontaneous dramatic activity. Thirdly, although it has been recognised since Aristotle's day that drama can release tension in both actors and audience, it is only since the war that the psycho-therapeutic possibilities of dramatic work, particularly with retarded and emotionally unstable children, have been widely recognised. This aspect of the subject is discussed by Richardson and also by Dodman in a valuable article. Finally, there has been a revolt against the practice, hallowed by long tradition and perpetuated by the examining bodies, of treating great plays mainly as means to the end of scholarship. Hudson and Muir have pleaded for a stage-centred approach in school and an end to the practice of treating children as textual critics in embryo who must learn by rote the notes in "the infernal Verities". The 'Play Way' method which uses dramatisation as a means of approaching many areas of the curriculum was pioneered by Caldwell Cook long before the period covered by this survey and the realisation of the educative nature of children's play is at least as old as Rousseau. It is widely held today that there should not be a sudden transition from play to plays, particularly the great classics of the theatre, when children move into secondary schools, and that the more creative and spontaneous dramatic activities pioneered with infants and juniors are still appropriate at least into the early teens.

It has often been claimed that training for dramatic performance and other kinds of oral work carries over into everyday life and has an important influence on social and personality development generally. It is to be hoped that these claims will be substantiated with objective evidence. The accurate assessment of the results of oral work is generally difficult except when it is a preparation for written work but it would be valuable to know how far verse speaking and choral work are an aid to appreciation and understanding as well as a method of cultivating good speech. The effects of a dramatic method of approaching plays as set texts need to be measured against the results of more conventional methods in terms of examination performance as well as attitude.

8. Examinations

I shall discuss at greater length in a subsequent article the vexed question of external examinations in literature and at what stage it becomes appropriate to attempt to test critical appreciation as opposed to knowledge about literature. A. A. Evans's article is an admirable discussion of the whole problem and he gives specimen papers to illustrate his belief that a lot of questions requiring short answers on an unseen passage provide a more reliable, painless and objectively assessable test of appreciation and comprehension than the traditional context and essay-type questions on set texts. Wynburne's experimental examination for training college students arises from the same dissatisfaction with the traditional essay-type question and requires candidates to comment on a number of brief critical opinions of a poem. Frances Stevens argues forcefully that exercises designed to test the ability of children to make an ordered critical response at the stage of selection for secondary education are pointless while showing that tests can be designed to give an indication of spontaneity of response, verbal fluency, variety of interests and ability to analyse and abstract.

Most of the other literature on this subject is concerned with deploring the cramping influence of external examinations, particularly the G.C.E., on the teacher's freedom of choice of text and technique, and the vicious habits of study they tend to encourage. I cannot do better than quote one of Evans's concluding paragraphs as a summary of the present position. "The examination in literature requires further investigation, and we have so far only entered the gateway of a vast and important field of research which might well influence and help to develop aesthetic education in the schools. A start might be made with a thorough investigation into the scripts and marks in a school leaving examination in literature and language over a period of years and with the setting of alternative papers for volunteer schools. The examination cannot but influence teaching and it should always be our aim to make our examinations educationally valuable in themselves and sensitive to the best teaching."

9. English and the Mass Media

The influence of the mass media particularly as it affects the English teacher has been discussed by Bate in Vol. III, No. 2 of this journal to which the reader is referred. The responsibility of the schools for training children in concentrated, selective and critical viewing, listening and reading and for instructing them in the history, organisation and scope of the various media has been recognised and it is usually assumed that this is one more responsibility that English teachers should shoulder. Some training colleges have started courses specifically designed to help teachers carry out this work and numerous conferences and courses, often run by the providers of the mass media, have been organised. There is also a rapidly growing literature on the subject. A number of volumes in the *Excursions Series for Young People* (Phoenix House) can be recommended and the publications of the British Film Institute, The Society of Teachers of Film, the B.B.C. and I.T.A. have been of considerable help to teachers. *Group View* and other publications of the Standing Conference on Television Viewing are extremely valuable and *Popular Culture and Personal Responsibility*, the verbatim report of a conference organised by the N.U.T. in October 1960 is an interesting document.

There are signs that all this is having an effect and that teachers' attitudes to the mass media are becoming more positive and constructive than they were at the time of the report of the Nuffield Foundation's study in 1958. The Jeremiahs of the profession who lamented the advent of T.V. are becoming less shrill though no amount of evidence that much of our literature is being made accessible to children not always and necessarily in an unworthy manner through the mass media will allay the fears of those who are convinced that nothing is so characteristic of the present age as the deterioration of the arts of literature. In a survey of the interest in books of 10-11 year old pupils, Carsley found that in the great majority of cases books which children elected to read after the experience of the story in another medium were books of acknowledged high quality, and, like other investigators, concluded that film, radio and T.V. are valuable allies of the teacher and librarian. On the other hand, the fact that children on average spend more time consuming the mass media than they spend in school underlines the importance of this whole subject and cannot but be a matter of concern to teachers.

The two articles in *Researches and Studies* referred to below give an interesting account of how the interests of secondary modern schoolboys in films was used to stimulate written composition and improve its quality. Work of this kind, often leading to the making of films by children is clearly valuable in the motivation of children who are backward in the basic subjects and could well be extended. It is also socially valuable in building up taste and discrimination. A number of studies, and notably those conducted or directed by Wall, have drawn attention to the fact that the early and middle teens are crucial in the development of newspaper and comic reading habits and also that few adolescents can unaided form serious, critical attitudes towards the popular press, cinema, radio and television. A lot of work remains to be done in finding the most effective ways of providing this aid and incorporating it as a permanent feature of the curriculum.

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Research Note:

THE SOCIAL PATTERN OF THE LENGTH OF FULL-TIME EDUCATION IN ESSEX

Editorial Note: The following research note sent by the Essex Local Education Authority, following an enquiry undertaken on their behalf by the Chief Education Officer, Dr. B. E. Lawrence and carried out by Mrs. J. A. Denyer of his staff is valuable not only because it is a contribution to knowledge but because it illustrates the kind of work which can be done in L.E.A. Offices. It is our impression that up and down the country work of a similar kind has been and is being done for specific local purposes, the results of which would be of wider interest. This journal will be happy to give space to further reports from Local Education Authorities.

THE Essex Education Committee have recently undertaken a survey of the way in which pupils have taken advantage of the increased facilities since the war for them to continue in full-time education at school, and to proceed to Universities. (Full-time education at Technical Colleges and similar places of full-time further education was not included in the survey.)

General

The 1961 Census population of Essex was 1,860,000, putting it behind only London (3,195,000), Middlesex (2,230,000) and Lancashire (2,200,000) in size of population. The social structure of the County is varied, with metropolitan industrial areas such as Dagenham and Barking in the south-west; dock areas at Tilbury and Harwich; almost wholly residential areas in Wanstead and Woodford and in Clacton; mixed townships such as Chelmsford, Brentwood, Braintree and Colchester; overspill New Towns at Harlow and Basildon, and completely rural areas covering much of central and north-east Essex. In general, the secondary schools are separate Grammar High Schools, Technical High Schools and Secondary Modern Schools, although there is a small number of bilateral schools (Grammar/Modern, Technical/Modern or Grammar/Technical) and one comprehensive school. All secondary schools admit the main body of their pupils at 11-plus, on the results of the General Admission Examination, and there is provision for further transfers to selective schools (Grammar and Technical) at 13-plus on the Second Admission Examination.

Nearly 21% of the age group are admitted to selective schools at 11-plus, and this figure rises to nearly 24% after the Second Admission Examination.

Except where stated, the figures that follow relate to pupils admitted to secondary schools in September, 1953, which is the latest year for which a complete school career could be followed for all children in the age group, as those with the longest schooling, including three years in the VIth Form, would not leave until July, 1961.

Education to 16

The policy of the Education Committee has been that education beyond the age of 15 should be provided not only in selective schools but also in secondary modern schools wherever there has been a local demand. These "extended courses" have spread rapidly in the past ten years and now cover almost all the County. The rate of development has varied from one part of the County to another, the largely residential areas showing an earlier enthusiasm than the rural and the industrial areas.

Over the County as a whole, in 1957/58 nearly 12% of the Secondary Modern age group remained at school for a full five-year course. By 1960/61 the figure had risen to 17%, ranging from 33% in a residential metropolitan area to 5% in an area almost entirely industrial, and 4% in a small rural town.

For the whole age-group, the percentage who receive full-time education to 16 at school, both selective and secondary modern, is now 36%, of whom one-third are at secondary modern schools.

Adjustments are still being made and will continue to be made for some years, but it is already clear that, in the future, G.C.E. 'O' level work will be done almost entirely in the schools, and while it is likely that for a decade or more there will be individual pupils who for one reason or another will look to a college of Further Education for 'O' level courses, if present trends continue this demand is likely to become very small indeed.

Secondary Modern Education Beyond 16

When provision was first made for extended courses it was intended that, after obtaining a reasonable 'O' level at the secondary modern school, a pupil might transfer to the VIth Form of a selective school for 'A' level work. Such transfers have been taking place in increasing numbers and already some students have graduated from University after an earlier career of this pattern. In some areas however, a different pattern is emerging in the development of VIth Forms in secondary modern schools. Two girls' schools, one in the residential seaside town of Clacton, and one in the County town of Chelmsford where the population is a fair cross section of all socio-economic groups, have for several years run two-year VIth Form courses, with numbers similar to those found in girls' grammar school VIth Forms before the war. The courses have a vocational bias; the academic work leads to 'A' level, and a large proportion of the girls have subsequently gone on to Teachers' Training Colleges or to Nurses Training Courses. There is an indication that the boys in the same areas are also becoming interested in a similar course, but numbers are still very small.

These pupils could not easily transfer to the selective school for 'A' level work because the numbers involved at the girls' schools are too large. But in any case it seems that they might well not choose to pursue their studies further if they could not do so in the school where they had spent their earlier career and were known and respected, and where the speed of the work is geared rather lower than in the grammar school, where University entrance demands often dictate the standard of work.

University Awards

The Committee have recently been concerned to learn from the Ministry of Education's statistical returns that Essex appears to send proportionately fewer students to Universities than the other counties immediately surrounding London and asked if there was any explanation of this.

It was thought that first a comparison should be made between the academic standard of Essex Grammar Schools, and Grammar Schools in the other home counties. For this purpose, an examination was made of the results at London 'A' level in the summer 1961 of 200 grammar schools in Essex, London and the remaining home counties. Of the 200 schools, 36 are in Essex and of these 5 are direct grant or independent schools, taking over half their pupils as approved Essex pupils on the results of the General Admission Examination. The sample of 200 included only maintained, direct grant and independent schools taking pupils mainly at 11-plus; public schools taking pupils mainly at 13-plus were not included, nor were comprehensive, bilateral or technical schools. Frequency distribution graphs were drawn of:

(1) The percentage of pupils offering one or more subjects at 'A' level. It was thought that this would be a measure of the pupils' *interest* in academic work.

(2) The percentage of pupils obtaining two or more, and three or more, passes at 'A' level. In contrast to (1), these graphs would indicate the academic *achievement* of the pupils.

The following extract from the tables, showing the results for three-stream single-sex schools, which were the largest group of schools in the whole sample of 200, indicate that any difference in the number of University awards could not be ascribed to any overall lower academic standard in the Essex schools.

Three Stream Boys' Schools

No. of candidates *offering* one or more 'A' level	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99
No. of schools in whole sample ..	4	2	8	10	9	3	4	1
No. of Essex Schools	1	0	1	1	3	1	0	0

Average number of candidates per school for all schools ..	56.3
Standard deviation	17.0
Average number of candidates per school for Essex schools ..	55.9
Standard deviation	15.5

No. of candidates *obtaining* two or more 'A' levels	10–19	20–29	30–39	40–49	50–59	60–69
No. of schools in whole sample	4	7	11	11	3	5
No. of Essex Schools	0	2	1	3	1	0

Average number of successful candidates per school for all schools 38.6
Standard deviation 14.5

Average number of successful candidates per school for Essex schools 38.8
Standard deviation 10.5

Three Stream Girls' Schools

No. of candidates *offering* one or more 'A' level	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89
No. of schools in whole sample . .	6	11	21	7	6	3	2	1
No. of Essex Schools	0	2	7	1	0	1	0	0

Average number of candidates per school for all schools . . 38.4
Standard deviation 15.9

Average number of candidates per school for Essex schools . . 36.3
Standard deviation 10.2

No. of candidates *obtaining* two or more 'A' levels	0–9	10–19	20–29	30–39	40–49	50–59	60–69
No. of schools in whole sample	3	14	24	10	4	1	1
No. of Essex schools	0	2	8	0	0	1	0

Average number of successful candidates per school for all schools 25.4
Standard deviation 11.6

Average number of successful candidates per school for Essex schools 25.4
Standard deviation 10.0

It seemed therefore to be worth enquiring whether there was any difference in the social structure of the home counties that might go some way towards explaining the difference in the number of University awards from one County to the next. Reference was made to two sets of tables in the Registrar General's County Reports based on the 1951 Census. The first table was the distribution of the population into 5 socio-economic occupational groups (I. Professional and allied occupations; II. Intermediate; III. Skilled; IV. Semi-skilled; V. Unskilled). The Essex distribution is very close to the average distribution over England and Wales as a whole, but the other home counties have a higher proportion of groups I and II; this arises from a complex of reasons, connected with the rate of land drainage (migration to Essex was blocked until the marshes were drained at the beginning of the 20th Century) and the development of communications to the west and south as Harwich, serving north and east Europe, declined in importance compared with ports serving America and the overseas colonies. The second table was that giving the proportion of the occupied male population whose education ended at 15, 16, 17, 19, 20 and over. Although care has to be used in drawing inferences from these latter tables, because the unoccupied male population will still largely be in full-time education, the age-group of interest in this study, that is, the parents of the pupils now at school and about to go to University, would all be over 20 and have completed their education.

The following table was drawn up for the Counties surrounding London, and for the West Riding of Yorkshire and Lancashire, which are the two Counties which are of comparable size with Essex:—

Counties arranged in order (highest first) of:—

Proportion of people in occupational group I	Proportion of people in occupational groups I and II	Proportion of occupied males educated to 20 and over	No. of State Scholarships	No. of State Scholarships and L.E.A. awards to Universities and other major establishments of Further Education
Surrey	Surrey	Surrey	Surrey	Surrey
Herts.	Middx.	Herts.	Herts.	Herts.
Middx.	Herts.	Middx.	Middx.	Middx.
Kent	Kent	Kent	Kent	Lancs.
Essex	Essex	Lancs.	Essex	Kent
Lancs.	Lancs.	Essex	W. Riding	Essex
W. Riding	W. Riding	W. Riding	Lancs.	W. Riding

There is a strong presumption on the form of these tables that, for these counties at least, higher education for the children is linked with higher education for the father, and with his occupation.

A subjective impression gained from day-to-day administration of individual problems, is that, for girls, if not boys as well, the length of education of the mother is an important factor, but this could not be tested with the information available, as the Census figures do not give information about length of women's education.

A further study was made of the income distribution of the parents of those students who went to University from among the age-group who entered secondary schools in 1953. By November 1961 the total figures were:—

Parental Income

Under £1,000			£1,000–£2,000			Over £2,000			All Incomes		
Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
48	10	58	110	46	156	55	27	82	213	83	296

In absolute terms, the income group £1,000—£2,000 gives the highest figure for both boys and girls, but the picture changes if we consider the distribution of incomes in the population as a whole. The Registrar General's figures for the distribution of individual incomes in 1960 (counting income of husband and wife as a single income) was, for England and Wales:—

Under £1,000	£1,000–£2,000	Over £2,000
86%	12%	2%

The incomes under £1,000 are likely to be heavily weighted by the salaries of single women, of young men under 25, and of retired people. Exact figures are not available to make an accurate correction, but from figures in the Census reports and in Ministry of Labour returns, a likely estimate of the distribution of incomes of families of an age to have children of 18-21 is:—

Under £1,000	£1,000–£2,000	Over £2,000
74%	22%	4%

Comparing this with the income distribution of families whose children actually went to the University:—

Under £1,000	£1,000–£2,000	Over £2,000
17%	52%	30%

we see the increasing likelihood that a student will go to University as the family income rises. We should be cautious however before concluding that family income is the prime determining factor. It is also possible that length of parental education is an important factor in determining both family income and the next generation's chances of a University education.

Sixth Forms in Grammar Schools

In view of the lead given above as to the influence of parental occupation on length of children's education, an attempt was made to relate the occupational background of the areas served by maintained grammar schools to the proportion of pupils remaining in the Sixth Form and taking 'A' level. The result of this enquiry was inconclusive; there is a tentative indication that large sixth forms are found in areas having *low* proportions of occupational groups I (Professional and similar occupations) and V (Unskilled), and this hypothesis could be reconciled with the earlier finding by supposing that occupational group I tends to send its children to independent and direct grant schools rather than maintained schools (figures for independent and direct grant schools were not available). There were too many exceptions, however, to regard this as other than a hypothesis to be tested for further study; the difficulty is that a school's area is not "closed"; parents can opt for schools within reasonable travelling distance of their homes, and a child's position in the results of the General Admission Examination determines its chances of getting the school of first choice. An old-established aided school, with a long-standing tradition, accordingly attracts children from many miles away, which may explain why the school sending the highest proportion of pupils to University is nevertheless in that part of Essex with the highest proportion of unskilled workers.

The kind of further study needed appears to have been started by the Ministry of Education who this year have undertaken a sample survey over the whole of the country in which returns are made of pupils' results at 'O' level, of other pupils' results at 'A' level, and of the occupation of the pupils' fathers. The classification is made on a four-point scale and is not strictly comparable with the Registrar General's five-point scale; the Ministry's group I appears to include the Registrar General's Group I and part of Group II; and the Ministry's Group IV to include both Groups IV and V of the Registrar General's classification. The return for Essex gave the following figures:—

Occupational Group	I	II	III	IV
	Professional Managerial etc.	Clerical	Skilled Artisan	Semi-skilled and unskilled
(a) No. of 'O' level candidates in sample	32	30	45	23
(b) No. of 'A' level candidates in sample	17	11	14	3
(c) % (b) of (a)	53	37	31	13

Again the indication is that the higher occupational groups are more likely to prolong their children's education than the lower.

In this Essex sample, the children in Group I obtained on average one more pass at 'O' level than the children in Groups II and III, and nearly two more passes than the children in Group IV.

Enquiries made of headmasters of grammar schools are revealing that in some areas the increase in the size of the sixth forms is caused by boys staying on who have achieved a reasonable 'O' level but are not of sufficiently high calibre to proceed to University. This appears to be happening mainly in schools serving fairly prosperous residential areas; small sixth forms are usually found in more industrial areas (though with exceptions, as noted above). This might be compared with the move for girls to remain in the Sixth Form in Secondary Modern Schools in certain areas and leads to the conclusion that the growth in the size of Sixth Forms since the war does not mean that all the talent of the young people in the country has yet been tapped. Good results are being obtained with students from homes in the higher occupational groups, but the incentives have yet to be found which will make higher education, and the type of employment it leads to, attractive to students from the homes of the semi-skilled and unskilled workers.

Research Note:

A STUDY IN THE ASSESSMENT AND GUIDANCE OF PREFECTS IN A COMPREHENSIVE SCHOOL

by Roy Harris

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THE prefectorial system has been generally accepted as an important and integral part of secondary school organisation. Since prefectship is so vitally associated with personality development it would seem that as much care and thought should be given to it as is given to other aspects of education. This investigation was carried out in a boys' comprehensive school to discover to what extent a planned guidance programme could contribute to the effectiveness with which prefects performed their duties. It was structured to lead prefects to a greater insight into their role and their responsibilities.

In order to assess prefect behaviour before and after the guidance a personality rating schedule of fifty-seven characteristics was compiled from those submitted by staff and boys. Each item was rated by them for importance on a five-point scale. There was agreement in ratings on 62% of the items. Members of staff from a modern, a grammar, a public and another comprehensive school also rated the items for importance. There was agreement in ratings by these schools on 67% of the items.

A prefect personality rating schedule of the thirty-three most important items was compiled. These were discussed with the Head Prefect and his two deputies who observed a random sample of twenty-eight prefects for seven weeks. At the end of this period they independently rated the twenty-eight prefects on this schedule on a five-point scale. Kendall's Coefficient of Concordance, giving an overall degree of agreement by the three raters, was equal to 0·73 and significant at the ·001 level, indicating that there was quite a close agreement.

The twenty-eight prefects were matched in pairs on the basis of their ratings and allocated to an experimental and control group at random. The experimental group participated in a four-month guidance programme. It consisted of duplicated notes relating to aspects of prefectship and personality together with questionnaires. The notes were issued weekly and were followed up with group-discussion meetings held under the leadership of the Senior House Master. The aim throughout the guidance was to encourage each prefect to: objectify the main factors relating to efficient performance as a prefect; gain some insight into his own personality; win his co-operation in the development of his own unique personality in order that he might become more efficient in the performance of his role as prefect; allow him an opportunity to discuss his problems with others.

The notes dealt with topics such as: the importance of the prefect system; responsibility and reliability; developing the right approach to others and winning their respect;

physical aspects of personality; privilege; popularity; prudence. They also read at their leisure Dale Carnegie's *How to Win Friends and Influence People*. The half-hour discussion group meetings were held after school.

After the guidance both groups of prefects were re-rated on the personality schedule by the three original raters. Kendall's Coefficient of Concordance was 0·87 and significant at the ·001 level, again indicating a close agreement.

The Wilcoxon Matched-Pairs Signed-Ranks Test, used to discover whether the guidance had helped the experimental group to become more effective than those in the control group, yielded no significant difference. Statistically, then, there was no support for supposing that the experimental group had benefited from the guidance.

The final questionnaire given to the experimental group was designed to obtain critical comments concerning the guidance programme. Replies indicated that the guidance had been beneficial. The discussion-group meetings were considered most helpful and they felt that they had developed greater insight while listening to the experiences of other prefects. They thought the course had been a little too prolonged and that a shorter, more intensive course would have been adequate. They agreed that similar guidance would help all prefects. They expressed a need for specific advice on dealing with friends and boys of their own age. They felt that they had become more tolerant, had attained greater emotional control, had become more conscientious and had developed a greater sense of responsibility.

Participation in early discussion meetings was somewhat limited. Much prompting was necessary by the leader. This was not surprising since they had had little, if any, prior experience of group discussion. An analysis of the final discussion showed greater spontaneity but there was still some evidence that the leader had to be fairly verbose himself. Conversational exchange was generally between a prefect and the leader and very seldom between prefects themselves. This was probably due to the fact that the leader was the Senior House Master resulting in considerable transfer of question and answer habits developed over many years in the more formal atmosphere of the classroom. Leaderless or prefect leadership discussion would possibly have been more productive. There seems to be some qualitative evidence that a guidance programme should involve some form of group discussion.

The most discriminative items were: ability in seeing orders are carried out; industrious; efficient; sense of responsibility; reliability; respect for privileges; punctuality. The most prevalent characteristics were: cheerfulness; willingness to accept advice; well-mannered; smart appearance; co-operative with staff; alert. The Spearman Rank Correlation Coefficient between discrimination and prevalence was $-0{\cdot}25$, indicating a tendency for the less prevalent items to be more discriminative, and *vice versa*. The most discriminative items appear to be those mainly concerned with the executive aspects of prefectship while the more prevalent items are related more to physical appearance and manner. It seems that guidance should stress factors associated with duty performance.

This enquiry was limited to prefects only but there is obviously much to be done in educating all pupils at different age levels for insight and responsibility. Not all can function as prefects but most pupils will have to shoulder, to some extent, responsibilities at work, within the family and as citizens with a vote.

The qualitative results of this investigation suggest that elementary psychological study could be helpful to older pupils. It is true that training for insight has to some extent been introduced in the teaching of different subjects, especially mathematics and science. It is considered that the time is now ripe for guidance methods to be introduced for the development of self-insight.

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